B 777

STANDARD OPERATING PROCEDURES

(Vol. 13 of Operations Training Manual)

Issued by:
Operations Training Division

PREFACE

The endeavour of the manufacturer, as a seller, is to present the customer with an efficient means of commercial transportation, not complicated, in terms of maintenance or flight operations. Therefore the manufacturer usually presents the minimum procedures required by an experienced and trained crew. However, in practice, we have to supplement the manufacturer's recommended procedure and adapt it to our environment.

The Air India Standard Operating Procedures (SOPs) are designed to streamline operational procedures. They provide the crew with a step-by-step guidance for carrying out their tasks in a safe & predictable manner.

These SOPs clarify line procedures, but do not replace the information contained in the Airplane Flight Manual and such documents.

The SOPs should not be over-shadowed by inter personal relations or other peripheral issues which tend to affect the safe conduct of a flight. Suggestions/ Comments may please be addressed to the General Manager - Operations, Training Division or email to opstrg@airindia.in.

(Capt. V.Kulkarni)
General Manager - Operations (Training)

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INTRODUCTION:

The SOP is organized in the following manner:

- PART A:
  General guidelines for Preflight Preparation and briefing.

- PART B:
  Aircraft identification, Limitations, Phraseologies & Normal Procedures.

- PART C:
  Explanatory information on various topics.

- PART D:
  Performance Guidelines.

- PART E:
  Non-Normal Procedures.

Scope of SOP

1. Standard tasks and duties of Flight Crew for each phase of flight.
2. Recall items followed by cross check with normal checklist
3. Supplemented by information on specific operating techniques like Adverse weather operation. Wet / Contaminated runway operation, ETOP, RVSM, BRNAV
4. Emphasis on use of all automatic functions as normal procedures.
5. Emphasis on
   - Task sharing
   - Optimum use of automation
   - Standard Callouts
   - Use of Normal Checklists
   - Approach and Go Around briefing
   - Altimeter setting and cross check
   - Descent profile
   - Energy management (1 NM per 10 Kts speed reduction on 3 degree GS, 5 seconds to get GA power from 15% power at Vapp)
   - Terrain awareness
   - Approach hazards awareness
   - Radio altimeter use
   - Stabilized approaches and approach gates
   - Approach procedures and techniques for various types of approach
   - Landing and braking technique for various runway and wind conditions
   - Readiness and commitment to go around
6. Operations Golden Rules
   - Fly, Navigate, Communicate, Manage
   - Cross check FMS with raw data
   - One head up at all times
   - Take over when things don't go as expected
   - Use proper level of automation
   - Practice task sharing and back up each other

7. Radio Altimeter

- In case no auto call out, verbalize "Radio Altimeter" by first crew member observing
- 1000 feet AGL cross check with pressure altimeter
- High OAT increase actual altitude and vice versa

8. Standard callouts

- Command
- Acknowledge
- Response
- Call out change/deviations
- Identify specific event

9. Windshear

Windshear is a change of wind speed and / or direction over a short distance along the flight plan. Indications of windshear are listed in the Maneuvers Section of the QRH.

Avoidance

The flight crew should search for any clues to the presence of windshear along the intended flight path. Presence of windshear may be indicated by :

- Thunderstorm activity
- Virga (rain that evaporates before reaching the ground)
- Pilot reports
- Low level windshear alerting (LLWAS) warnings

Stay clear of thunderstorm cells and heavy precipiration and areas of known windshear. If the presence of windshear is confirmed, delay takeoff or do not continue an approach.

Precautions

If windshear is suspected , be alert to any of the danger signals and be prepared for the possibility of an inadvertent

encounter. The following precautionary actions are recommended if windshear is suspected :-

Takeoff

- Use maximum takeoff thrust instead of reduced thrust.
- For optimum takeoff performance, use flaps 20 for takeoff unless limited by obstacle clearance and / or climb gradient. Flaps 15 may be used as a precautionary setting and will provide nearly equivalent performance to Flaps 20.
- Use the longest suitable runway provided it is clear of areas of known windshear.
- Use the flight director after takeoff.
- Consider increasing Vr speed to the performance limited gross weight rotation speed, not be exceed actual gross weight Vr +20 knots. Set V speeds for the actual gross weight. Rotate at the adjusted (higher) rotation speed. This increased rotation speed results in an increased stall margin, and meets takeoff performance requirements. If windshear is encountered at or beyond the actual gross weight Vr, do not attempt to accelerate to the increased Vr, but rotate without hesitation.
- Be alert for any airspeed fluctuations during takeoff and initial climb. Such fluctuations may be the first indication of windshear.
- Know the all-engine initial climb pitch attitude. Rotate at the normal rate to this attitude for all non-engine failure takeoffs. Minimize reductions from the initial climb pitch attitude until terrain and obstruction clearance is assured, unless stick shaker activates.
- Crew co-ordination and awareness are very important. Develop an awareness of normal values of airspeed, attitude, vertical speed and airspeed build-up. Closely monitor vertical flight path instruments such as vertical speed and altimeters. The Pilot monitoring should be especially aware of vertical path instruments and call out any deviations from normal.
- Should airspeed fall below the trim airspeed, unusual control column forces may be required to maintain the

desired pitch attitude. Stick shaker must be respected at all times.

Approach and Landing

- Use either Flaps 25 or 30 for landing.
- Establish a stabilized approach no lower than 1000 feet above the airport to improve windshear recognition capability.
- Use the most suitable runway that avoids the areas of suspected windshear and is compatible with the crosswind or tailwind. Limitations. Use ILS G/S, VNAV path or VASI / PAPI indications to detect flight path deviations and help with timely detection of windshear.
- If the autothrottle is disengaged, or is planned to be disengaged prior to landing, add an appropriate airspeed correction (correction applied in the same manner as gust), up to a maximum of 20 knots.
- Avoid large thrust reductions or trim changes in response to sudden airspeed increases as these may be followed by airspeed decreases.
- Crosscheck flight director commands using vertical flight path instruments.
- Crew co-ordination and awareness are very important, particularly at night or in marginal weather conditions. Closely monitor the vertical flight path instruments such as vertical speed, altimeters and glide slope displacement. The Pilot monitoring should call out any deviations from normal. Use of autopilot and autothrottle for the approach may provide more monitoring and recognition time.

Recovery

Accomplish the WINDSHEAR ESCAPE MANEUVER found in the Maneuvers section of the QRH.

10. Regulatory definitions

11. Safeguards

- Triggers or events initiating group of actions
- Action blocks – group of actions being accomplished in sequence
- Action patterns – flight deck panel scanning sequence or patterns supporting flow of action blocks
- Standard callouts

12. Task sharing – Role of PF/PNF in auto flight and manual flight
13. Sterile cockpit – managing interruptions – does not mean silent cockpit or absence of standard callouts. When cabin crew should break sterile cockpit rule.
14. Selection of automation for various phases of flight

PREPARING FOR A FLIGHT:

Before operating a flight, the Crew should be familiar with a few aspects, specific to the route flown and the following documents:

1) Flight Crew Operations Manual (FCOM) Volumes 1 & 2.

2) Flight Crew Training Manual (FCTM).

3) Company Operations Manual.

4) Extended Range Operations (ETOPS) Manual

5) Reduced Vertical Separation Minima (RVSM) Manual.

6) Regulated TakeOff Weight (RTOW) Tables.

7) Performance Guidelines.

8) Company Weather Minima.

9) Circulars available in the File Onboard or through the website.
   Obtain your password from Flight Operations, Old Airport.

10) Jeppesen Manuals, (structure and contents).

11) Local Aeronautical Information Publications (A.I.P).

12) Departure & Destination, Take off Alternates, Enroute Alternates, Destination Alternates & Routings to Alternates. ICAO designators & all Instrument Approach Charts. Time of Airport Curfew, Noise Abatement Procedure, Speed Restrictions for Climb & Descent. SID, STAR, Preferential Runway System, Types of landing Aids, Approach Lighting systems, Visual descent aid. Normal Parking Bay, Parking & Stopping Aids.

13) Deciphering a Computerized Flight Plan (CFPL). Old Plans may be obtained from the MIS section for route familiarization.

14) Applicable Enroute Charts/ FIRs/ Met Reporting Waypoints/ Navigation Aids (Frequencies & Identification)/ Region of highest Grid MORA/ Departure & Arrival MSA/ Countries Over-flown/ Airway designator & Airway Width.

15) Local Time difference from UTC.

16) ATC Communication frequencies for Departure / Destination & Alternates: (Clearance Prior Taxi (CPT), Ground: Pushback-Start Up-Taxi. Tower, Control, HF, Destination and Enroute Weather (Wx), Enroute Company (VHF, HF), Enroute ATIS /Volmet with time & Stations for which Weather is broadcasted.

17) Emergency: HF Frequencies, 121.5, Squawk codes for Hijack, Communication Failure & Distress.
Refer to "Emergency" chapter in Jeppesen.

18) Danger Areas & Prohibited Areas along Airways towards which diversion should not be made incase of Weather/Emergency.

19) ATC Differences.

20) Calculation of FDTL.

All information is available at Technical Library, Ground Floor Air India Operations, Old Airport.

CREW RESPONSIBILITY:

Crew shall be responsible for the validity of their licences and certificates & always carry the following :

1. Valid BCAS & Air India Identity Cards.
2. Crew Licences.
3. Radio Operators License.
4. Crew Member Certificate.
5. Applicable Valid Training Certificates for PPC, IR, Route Check, SEP, GTR, DGR, CRM, LVTO, TCAS, MNPS, EGPWS, RNAV, RVSM.
6. Valid CA 35, Medical Assessment, Health card (if applicable).
7. CAT II/CAT III - Certificate of Competence (if applicable).
8. Transit Check Certificate (if applicable).
9. For Route Checks, carry updated Log book.
10. Passport (for all International flights).
11. Serviceable Flashlight (powerful enough to inspect the Tail-plane).
12. Extra spectacles (if applicable). Use spectacles that can be accommodated within the smoke goggles.

    Headgear (if worn) may make it difficult/impossible to don an Oxygen Mask).
13. Atleast one set of clothes in the flight bag (in case of outstation AOG).
14. For passenger travel, one set of uniform should be carried in the handbag.

CREW UNIFORM:

- The uniform must be worn respectfully.
- Adhere to company provided uniforms only.
- Turn out should be as per the Uniform and Dress Regulations.
- Full sleeves should be rolled down and Collar buttoned up when in view of passengers / public.
- Cap must be worn in the presence of passengers & are not to be held in the hand, on the trolley handles or kept away in bags.
- Male crew are not permitted to have long hair or long side burns or very long unkept beard or a pony tail or ear/nose rings.

DRESS CODE:

Crew visiting the office, training establishment, other company offices, traveling as passenger on duty, being positioned for flights or returning to base on completion of flight, must be properly dressed.

- Crew must wear full / half sleeve shirts, tucked in trousers and formal socks and shoes.
- Garments such as jeans, tee/bush shirts, kurtas, sports shoes, sandals, chappals etc must not be worn.
- Female pilots must be similarly attired in equivalent formal/semi formal dress.

SUPERNUMERARY TRAVEL:

Whenever crew are scheduled to travel as ‘Supy’ on Air India flights, the following procedure must be followed:

- Travel must be in uniform.
- Crew must report to the Commander at reporting time.
- The Commander’s signature must be obtained on the immigration / custom forms as applicable.
- In case the Commander is in transit, i.e. remains on board the aircraft, the crew must report to Flight Dispatch at the reporting time and ensure that appropriate formalities are completed.

TRANSPORT AND CHECK IN:

In Mumbai, the Transport personnel may be contacted on Telephone 28318454, 09920571686.

In Mumbai, a porter is usually positioned to cart the crew baggage from the transport, X-ray it by security and then take it to the crew check in counter.

The Reporting time is mentioned on the flight program. It is usually one hour and thirty minutes prior to the departure.
[1 hr: 30 min]

ON REACHING THE FLIGHT DESPATCH:

First complete PFMBT (Preflight Medical Breathalyzer Test).

- Collect allowance (if applicable).
- Check Circulars & pigeon hole.
- Fill the Crew Reporting time form, Custom Declaration form and Immigration Form (for International Flights only).

Perform the Medical Test in accordance with the Operations Manual.

Make an entry in the Crew Reporting Form, mentioning the following details:

1) Flight No:
2) Date and Place:

MANUALS & DOCUMENTS:

The document briefcase is normally on the airplane. The First Officer must check that all documents as per the list onboard, in accordance with the Preliminary Preflight Procedures. (BOM/DEL in disp. Check with DFO)

Check over flying permissions in case of Charter Operations, New Routes, Non-scheduled flights etc.

First Officer shall check the Jeppesen Manuals have been signed for validity.

Check the number of pages for the airport tallies with that on the index page.

Sign the form for the Jeppesen Manuals checked (Captain or First Officer – by the crew member who has checked the manual).

All the departure, destination and alternates as required by the pattern of movement for that airplane should be checked. The pattern of movement is written on the form attached.

Note: The Jeppesen Manual Numbers to confirm that same manuals are loaded on board.

CABIN CREW:

The Inflight Supervisor (IFS)/Cabin In-charge (CIC) will introduce the cabin crew to the Captain & the First Officer. If the Cabin Crew has not met the Cockpit Crew in dispatch, they shall do so onboard.

<table>
<tr><th>CAPTAIN</th><th>FIRST OFFICER</th></tr>
<tr><td>Ensure their turn out is correct. Brief them for standard or specific instructions.

Guidelines for briefing:
• Any anticipated delays.
• Gate Number / Parking Stand.
• Short Taxi time.
• Weather conditions.
• Normal Entry Code.
• Anti-Hijack Code.
• Location of DG (if any)
• Jump Seat riders.

Sign Cabin Crew Customs and Immigration forms.</td><td>Must be present for the Captain's brief to the Cabin Crew.

Give the Flight Details for all sectors to the IFS/CIC.

The IFS/CIC will carry the Cockpit Crew Immigration and Customs Declaration, and leave it at the respective desks.

If Cabin Crew are onboard, the First Officer will carry these papers.</td></tr>
</table>

REMOTE DISPATCH:

The remote dispatcher analyses and sends:

1. Flight Release message.
2. CFPLs. (generated with an EZFW as per the booked load)
3. Weather: TAFORs, METARs and weather charts for Departure, Take Off Alternate, Enroute Alternate(s), Destination(s) and Destination(s) alternate(s).
4. NOTAMs.

Commercial staff will provide only the flight documents / ZFW / Bay Number and take the Final Fuel figure from Crew.

As they are not qualified, the Commercial staff are not required to brief the crew on any operational matter.

In case of any MEL/DDPG/CDL requirements involving performance corrections, the same must be applied and a snag telex sent to down line stations and Mumbai.
Fresh Flight Plan(s) may be obtained from dispatch, if required.

GUIDELINES FOR BRIEFING:

The Flight Dispatcher (at available stations) will conduct a briefing. In other cases, the crew will conduct a self briefing.

CAPTAIN	FIRST OFFICER
Note the reporting time on CFPL.	Note the reporting time on CFPL (enter it on the Pilots Report later).
Crosscheck along with First Officer.	Serviceability of the Airplane/APU. (MEL/CDL/DDPG restrictions) Fuel remaining on board. Boarding Gate Number, Parking Bay Number.
Crosscheck along with First Officer.	Flight Release Message: This gives a concise brief of sent documents and significant Notams affecting the flight. Check all the papers are available as per Flight Release Message.
FIC/ADC as required. Crosscheck along with First Officer.	Check the CFPLs: • RC numbers and page numbering for all sectors. • Planned ZFW. • Planned Cruise Mode. • Route. • Planned Level. • Planned Alternate. • Secondary Flight Plans. • ETOPS Alternates. • Minimum Fuel Required. • ATC Flight Plan. The CFPL may also be in error. Check for obvious errors in Time, Distance & burn-off.

CAPTAIN	FIRST OFFICER
Crosscheck along with First Officer.	Weather Briefing: The Weather may affect the choice of routing, flight level & the fuel uplifted. Weather Charts & TAFORS should be briefed for Airports in the following sequence: Departure/ Take off Alternate/ Enroute Alternate(s)/ Destination/ Destination alternate(s). Check validity of forecasts for the return flight. ETOPS weather minima for dispatch of ETOPS flights. Consider obtaining METARs for destination and alternates for short range flights. Significant Weather. Areas of reported CAT. Winds and temperatures aloft.
Crosscheck along with First Officer.	NOTAMS Company Advisories
Crosscheck along with First Officer.	Calculate the RTOW and for ETK, based on the revised ZFW, calculate the maximum fuel that can be uplifted, limited by the fuel tank capacity.

<table>
<tr><th>CAPTAIN</th><th>FIRST OFFICER</th></tr>
<tr><td colspan="2">Decide the fuel to be uplifted for the sector, with regard to the Company Fuel Policy & Circulars on additional Fuel Uplift.

Known delays due to weather / previous route experience may warrant additional fuel uplift.

Consideration must be given to the affect on landing performance for the increase in landing weight, especially on ETK sectors with Adverse weather & surface conditions on arrival.

The Crew may uplift additional fuel, but state in detail the reason for doing so.
• Delta Factor [ZFW]
• Performance Adjustment [PAD]
• Destination Weather [WXD]
• Farther Alternate [ALT]
• Economic Tankering [ETK]
• Fuel already on board [FOB]

<u>Note</u>: That the CAD terminology stands cancelled with immediate effect.</td></tr>
<tr><td>Update the Endurance as per the average consumption on the CFPL.</td><td>Update the Endurance as per the average consumption on the CFPL.</td></tr>
<tr><td>Cross check the First Officer’s Calculations.</td><td>Calculate the ETOW.
Subtract the Trip fuel from ETOW and check that the Landing weight is within limits.</td></tr>
<tr><td></td><td>Fill the Total fuel required in KGS and sign the card.
Note the Gate/Bay no. on RHS corner.</td></tr>
<tr><td>Sign on all CFPLs including office copy.</td><td>All documents must be kept in an envelope and carried in the flight bag.</td></tr>
</table>

IMMIGRATION & CUSTOMS:

- One copy of the Immigration clearance is retained by the F/O duly stamped & signed at Mumbai only.

- Immigration forms are not required to be filled for a domestic flight & no clearance is required.

- The 2nd and 3rd copy of the customs declaration is retained by the crew after clearance, one of which is kept by each crewmember.
  The custom's officer retains the 1st & 4th copy. All copies are duly stamped & signed.

<u>The crew must retain their copies for re-clearance on arrival at an Indian station.</u>

Reach the aircraft latest by Departure Time minus 30 minutes and for ULR flights, Departure Time minus 45 minutes.

AIRPLANE IDENTIFICATION:

Airplane Registry Number is supplied by the National Regulatory Agency. Serial Numbers and Tabulation Numbers are supplied by Boeing.

Registry Number	Aircraft / Engine Type	Serial Number	Tabulation Number
VT-AIJ	-200 ER; PW4090	26943	WB059
VT-AIK	-200 ER; PW4090	28714	WB070
VT-AIL	-200 ER; PW4090	26935	WB058
VT-AIR	-200 A; PW4077	26917	WA007
VT-ALA	-200 LR; GE90-110B1	36300	WD011
VT-ALB	-200 LR; GE90-110B1	36301	WD012
VT-ALC	-200 LR; GE90-110B1	36302	WD013
VT-ALD	-200 LR; GE90-110B1	36303	WD014
VT-ALE	-200 LR; GE90-110B1	36304	WD015
VT-ALF	-200 LR; GE90-110B1	36305	WD016
VT-ALG	-200 LR; GE90-110B1	36306	WD017
VT-ALH	-200 LR; GE90-110B1	36307	WD018
VT-ALJ	-300 ER; GE90-115B	36308	WD826
VT-ALK	-300 ER; GE90-115B	36309	WD827
VT-ALL	-300 ER; GE90-115B	36310	WD828
VT-ALM	-300 ER; GE90-115B	36311	WD829
VT-ALN	-300 ER; GE90-115B	36312	WD830
VT-ALO	-300 ER; GE90-115B	36313	WD831
VT-ALP	-300 ER; GE90-115B	36314	WD832
VT-ALQ	-300 ER; GE90-115B	36315	WD833
VT-ALR	-300 ER; GE90-115B	36316	WD834

General

This Chapter contains Airplane Flight Manual (AFM) limitations and Boeing recommended non-AFM operating limitations. Limitations that are obvious, shown on displays or placards, or incorporated within an operating procedure are not contained in this chapter.

Airplane General

Operating Limits	
Runway Slope	+/1 2%

VT-AIJ - VT-AIR

Maximum Takeoff and Landing Tailwind Component	10 knots

VT-ALA - VT-ALR

Maximum Takeoff and Landing Tailwind Component	15 knots

Maximum Operating Altitude	43,100 feet pressure altitude
Maximum Takeoff and Landing Altitude	8,400 feet pressure altitude

Non–AFM Operational Information

The turbulent air penetration speed (in severe turbulence) is defined as: 270 knots below 25,000 feet, 280 knots or 0.82 Mach whichever is lower at 25,000 feet and above. Maintain a minimum speed of 15 knots above the minimum maneuvering speed at all altitudes when airspeed is below 0.82 Mach.

Do not operate HF radios during refueling operations.

Do not operate the weather radar in a hangar or within 50 feet (15.25 meters) of any personnel or a fuel spill.

Note: The hangar and personnel restrictions do not apply to the weather radar test mode.

RVSM Operations

Non-AFM Operational Information

Prior to takeoff the maximum allowable difference between Captain's or First Officer's altitude display and field elevation is 75 feet.

The standby altimeter does not meet altimeter accuracy requirements of RVSM airspace.

Takeoff Procedure

VT-AIJ - VT-AIL

Non-AFM Operational Information

If the reported wind from any direction is less than 10 knots, a normal rolling takeoff is permissible.

If the reported wind is 10 knots or greater, come to a complete stop on the runway, then release brakes and accomplish a normal takeoff procedure.

Weight Limitations

VT-AIR

Weights	Kilograms
Maximum Taxi Weight	248,115
Maximum Takeoff Weight	247,207
Maximum Landing Weight	201,848
Maximum Zero Fuel Weight	190,508

VT-ALA - VT-ALH

Weights	Kilograms
Maximum Taxi Weight	348,358
Maximum Takeoff Weight	347,451
Maximum Landing Weight	223,167
Maximum Zero Fuel Weight	209,106

(SB Deletes VT-AIJ - VT-AIL; before SB, modification to operate at PW4077 thrust rating not installed)

Weights	Kilograms
Maximum Taxi Weight	291,659
Maximum Takeoff Weight	290,299
Maximum Landing Weight	208,652
Maximum Zero Fuel Weight	195,044

(SB Adds VT-AIJ - VT-AIL; SB installs modification to operate at increased Maximum Landing and Maximum Zero Fuel Weights.)

Weights	Kilograms
Maximum Taxi Weight	291,659
Maximum Takeoff Weight	290,299
Maximum Landing Weight	213,188
Maximum Zero Fuel Weight	199,580

VT-ALJ - VT-ALR

Weights	Kilograms
Maximum Taxi Weight	344,730
Maximum Takeoff Weight	343,823
Maximum Landing Weight	251,290
Maximum Zero Fuel Weight	237,682

Door Mounted Power Assists and Escape Slides

VT-AIJ - VT-AIR

Main door emergency power assists and evacuation slide systems must be armed with the mode select handle in the ARMED position prior to taxi, takeoff and landing whenever passengers are carried.

VT-ALA - VT-ALR

Main door emergency power assists and evacuation slide systems must be armed with the mode select handle in the AUTOMATIC position prior to taxi, takeoff and landing whenever passengers are carried.

Flight Deck Security Door
VT-ALA - VT-ALR

(SB changes VT-AIJ - VT-AIR; after SB. SB installs enhanced security flight deck door.)

Verify that an operational check of the Flight Deck Access System has been accomplished according to approved procedures once each flight day.

Air Systems

Cabin Pressurization

Maximum differential pressure (relief valves)	9.1 psi
Maximum allowable cabin pressure differential for takeoff and landing	0.11 psi

Autoflight

Autopilot/Flight Director System

The autopilot must not be engaged below a minimum engage altitude of 200 feet AGL after takeoff.

The autopilot must be disengaged before the airplane descends more than 50 feet below the MDA unless it is coupled to an ILS glideslope and localizer or in the go–around mode.

Without LAND 2 or LAND 3 annunciated, the autopilot must be disengaged below 200 feet AGL.

(SB Deletes VT-AIR; before SB, modification to prevent trim adjustments with autopilot engaged not installed)

Use of aileron trim with the autopilot engaged is prohibited.

Automatic Landing

When landing weather minima are predicated on autoland operations the following limits apply:

Maximum Allowable Wind Speeds	
Headwind	25 knots
VT-AIJ - VT-AIR	
Tailwind	10 knots
VT-ALA - VT-ALR	
Tailwind	15 knots
Crosswind	25knots

The maximum glideslope angle is 3.25 degrees.

The minimum glideslope angle is 2.5 degrees.

Automatic landings can be made using flaps 20 or 30, with both engines operative

or one engine inoperative. The autopilot flight director system (AFDS) autoland status annunciation must display LAND 2 or LAND 3.

Communications

Flight Deck Communications Systems (Datalink)

The datalink from the COMPANY format is limited to the transmission and receipt of messages, which will not create an unsafe condition if the message is improperly received, such as the following conditions:

- the message or parts of the message are delayed or not received,
- the message is delivered to the wrong recipient, or
- the message content may be frequently corrupted.

However, Pre-Departure Clearance, Digital Automatic Terminal Information Service, Oceanic Clearances, Weight & Balance, and Takeoff Data messages can be transmitted and received via the COMPANY format if they are verified per approved operational procedures.

HF Communication System

VT-ALA - VT-ALH

If one HF radio is selected for transmission, deselect the other HF radio on all audio control panels to prevent audio interference.

Engines

Engine Limit Display Markings

Maximum and minimum limits are red.

Caution limits are amber.

Engine Oil System

VT-AIJ - VT-AIR

Oil temperature must be greater than 50 degrees C before advancing thrust levers

to takeoff power.

Engine Fuel System

The maximum tank fuel temperature is 49 degrees C.

Tank fuel temperature prior to takeoff must not be less than -40 degrees C or 3 degrees C above the fuel freezing point, whichever is higher. In-flight tank fuel temperature must be maintained at least 3 degrees C above the freezing point of the fuel being used. The use of Fuel System Icing Inhibitor additives does not change the minimum fuel tank temperature limit.

Reverse Thrust

Intentional selection of reverse thrust in flight is prohibited.

Backing the airplane with use of reverse thrust is prohibited.

Non-AFM Operational Information

VT-ALA - VT-ALR

For ground operation (exclusive of takeoff) in tailwinds and crosswinds between 30 and 45 knots, engine power should be limited to a maximum of 70% N1. Avoid thrust levels above that required for normal taxi operation in all tailwinds and crosswinds greater than 45 knots.

Airplane Structure

Flight Controls

Avoid rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large side slip angles) as they may result in structural failure at any speed, including below VA.

Flight Instruments, Displays

Ground Maneuver Camera System

VT-ALJ - VT-ALR

The ground maneuver cameras should not be used during takeoff, approach, and landing.

Electronic Flight Bag (EFB)

VT-ALA - VT-ALR

The EFB portable keyboard and attaching cable must be stowed during takeoff and landing.

Flight Management, Navigation

ADIRU

ADIRU alignment must not be attempted at latitudes greater than 78 degrees, 14.75 minutes.

QFE Selection

A QFE altitude reference for the primary flight displays must be selected in the flight management system whenever QFE is used instead of QNH.

Fuel System

Main tanks must be scheduled to be full if center tank fuel is loaded.

Note: The center tank may contain up to 1360 kilograms of fuel with less than full main tanks provided center tank fuel weight plus actual zero fuel weight does not exceed the maximum zero fuel weight, and center of gravity limits are observed.

Warning Systems

GPWS - Look-Ahead Terrain Alerting
VT-AIJ - VT-AIL, VT-ALA - VT-ALR

(SB Adds VT-AIR; after SB. SB look-ahead terrain alerting installed.)

Do not use the terrain display for navigation.

(SB Deletes VT-AIK; before SB, -212 or later GPWS computer with geometric altimetry not installed.)

The use of look-ahead terrain alerting and terrain display functions is prohibited during QFE operations.

The use of look-ahead terrain alerting and terrain display functions is prohibited within 15 NM of takeoff, approach or landing at an airport or runway not contained in the GPWS terrain database. Refer to Honeywell Document 060-4267-000 for airports and runways contained in the installed GPWS database.

TCAS

Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with a TCAS II resolution advisory.

PHRASEOLOGY DEFINITIONS:

- “CHECK” callout means the pilot confirms/acknowledges an indication or action.

- “VERIFY” means to confirm either visually, orally or both that the intended task/status has been correctly achieved.
  In the event of non-conformity with required status a call must be made immediately.

- “CROSSCHECK” callout means the pilot confirms what the other pilot has checked.

- The response “CHECKED” indicates that the call is valid and understood. If a standard call or FMA call is responded to by another standard call or FMA call, the response “CHECKED” is omitted.

- The response “CORRECTING” indicates that the deviation callout is valid and that crew member is taking the appropriate action.

- “SET” command means to accomplish the specified action by simply rotating the appropriate selection knob.

- “ENGAGE” command means to PUSH the specified push button to engage guidance.

- “ARM” command means to arm a system or to push the specified push button to arm a guidance.

- “DESELECT” command means to PUSH the specified button to deselect a previously selected guidance.

  <u>All valid commands must be actioned and appropriately acknowledged.</u>

NORMAL PROCEDURES PHILOSOPHY AND ASSUMPTIONS

Normal procedures are done by recall and scan flow.

If there is an incorrect configuration or response:

- Verify that the system controls are set correctly
- Check the respective circuit breaker (DO NOT RESET AN OPEN CB BEFORE CONFIRMING IT WITH THE AME).
- Test the respective system light as needed before engine start, review the EICAS alert messages and status display.

Before engine start, review the EICAS **status messages** as these indicate equipment faults, which **may** effect airplane dispatch capability. Discuss with AME if required.

After engine start, EICAS alert messages are the **primary** means of alerting the flight crew to non-normal conditions or incorrect configurations.

After engine start, there is no need to check status messages. Any message that has an adverse affect on safe continuation of the flight appears as an EICAS alert message.

CREW DUTIES

Preflight and postflight duties are divided between the Captain and First officer. Phase of flight duties are divided between the Pilot Flying(PF) and the Pilot Monitoring(PM).

The general PF phase of flight responsibilities are:

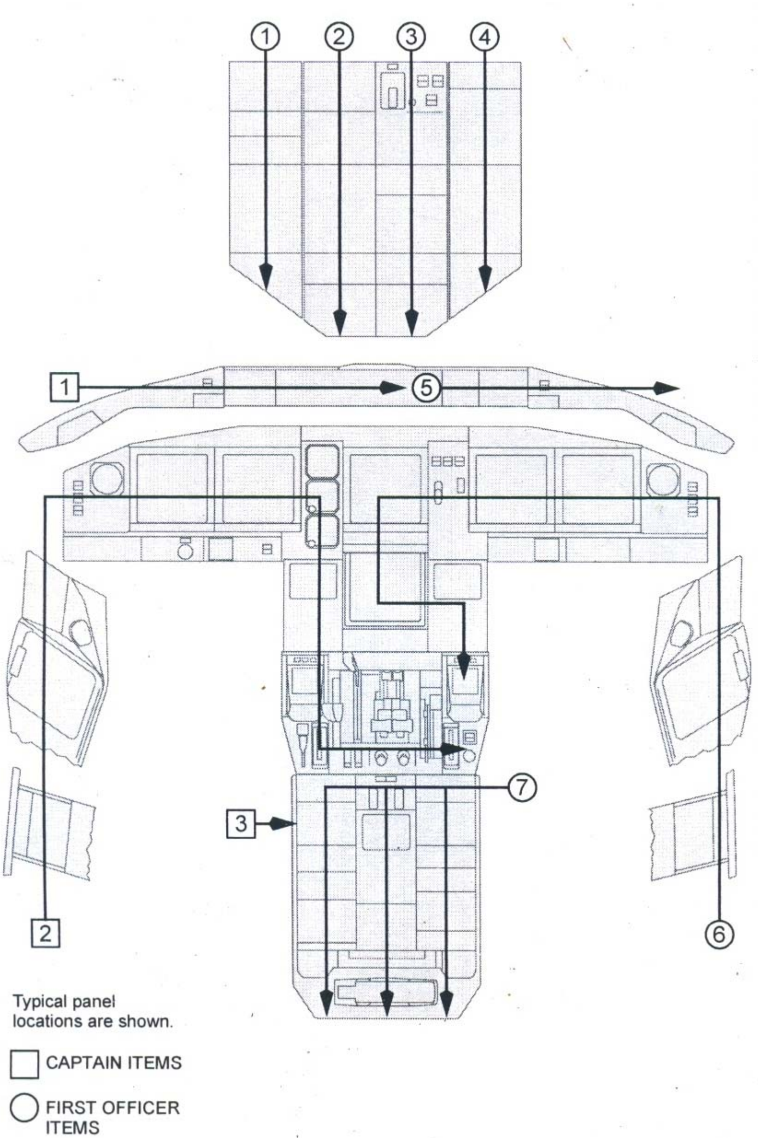
- Taxing
- Flight path and airspeed control
- Airplane configuration
- Navigation

The general PM phase of flight responsibilities are:

- Checklist reading
- Callout all FMA changes
- Communication
- Tasks asked for by the PF

The CAPTAIN hereafter means the Commander of the flight.

PREFLIGHT AND POSTFLIGHT SCANFLOW



PRELIMINARY PREFLIGHT PROCEDURE (CAPTAIN OR FIRST OFFICER)

The Preliminary Preflight Procedure assumes that the Electrical Power Up Supplementary Procedure is complete. Refer to Supplementary Electrical Power Up Procedure (SP 6.1 of FCOM-1), if needed.

CAPTAIN	FIRST OFFICER
ADIRU switch.............. **OFF, then ON** Verify that the ON BAT light is extinguished. Verify that the OFF light is extinguished. (Switch to remain OFF for a minimum 30 seconds before being selected ON. Full alignment takes 6 to 15 minutes depending on the latitude.) **VT-ALF – VT-ALH,** **VT-ALO – VT-ALR** **VOICE RECORDER** switch .. .. **ON**	
STATUS display ...... **Check** Verify that only expected messages are shown. i.e Status messages associated with MEL release. If any other status messages exist, inform AME.	**VT-ALA – VT-ALR,** **VT-AIJ – VT-AIR** **FLIGHT DECK ACCESS SYSTEM** switch .... Guard closed

CAPTAIN	FIRST OFFICER
Verify that the following are sufficient for flight : • Oxygen pressure (refer Flight Planning & Performance Manual) • Hydraulic quantity - displays system reservoir quantity as a percentage of the normal service level (1.00 is the normal service level) - LO (amber) – displayed when the reservoir quantity is low - OF (white) - displayed when the reservoir is over – full (inhibited in flight) - RF (White) - displayed when the reservoir requires refilling (inhibited in flight) • Engine oil quantity Do the remaining actions when first taking over a/c or after a crew change or maintenance action	
Maintenance documents .... Check	**Emergency equipment .... Check** Fire extinguisher (BCF - needle in the green Band & locking pin intact and wire locked) ...... checked & stowed

CAPTAIN	FIRST OFFICER
	Crash axe .... Stowed Escape ropes .... (on both sides) .... Stowed PBE (Smoke Hood) .....Stowed Smoke Goggles(4) ..... Stowed Asbestos Gloves .... Stowed Life vest (4) .... Stowed Quick Donning O2 mask units. (3rd and 4th observers seat–check) .... Stowed Flash Lights (2) .... Check and Stowed **Overhead maintenance** panel .... **Guards closed** Verify that all lights are extinguished. CARGO TEMPERATURE selectors .... As needed Note : At LOW setting, 40 – 50 F (4.5 – 10 C); At HIGH setting, 65-75 F (18.3 – 23.9 C) is maintained.
Parking brake .... Set (Note : Apply the parking brake as brake wear indicators will be checked during the exterior inspection) **FMS CDU .... Preflight Procedure**	**Circuit breakers** ..... **Check** (Check with AME before resetting a tripped CB) **Flight Documents** .....**Place** **Nav light** ....**On** **ATIS** .... **Obtain**

CAPTAIN	FIRST OFFICER
	Proceed for Exterior inspection **Note: Though it is written for First Officer, both pilots can do it.**

NOTE : The crew member who is not proceeding for the exterior inspection will perform CDU PREFLIGHT PROCEDURE and the same will be verified by the other crew on his / her return from the exterior inspection, as part of his/her flow pattern.

Exterior Inspection

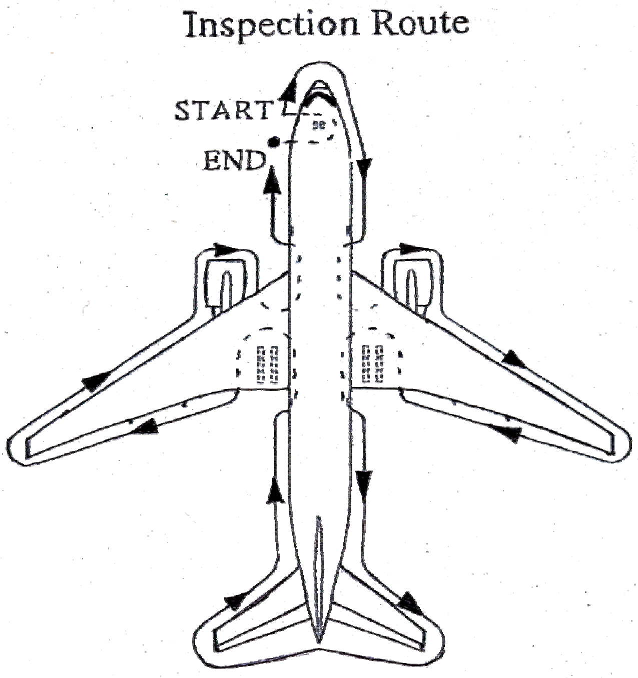
Before each flight the captain or first officer must verify that the airplane is satisfactory for flight.

Note : For cold weather operations see the Supplementary Procedures.

Note : PIC must be informed of any deviation from the list below.

Items at each location may be checked in any sequence.

Use the detailed inspection route below to check that :



- The surfaces and structures are clear, not damaged, not missing parts and there are no fluid leaks
- Frost, Snow or Ice is not present on critical surfaces.
- The tires are not too worn, not damaged, and there is no tread separation
- The gear struts are not fully compressed
- The engine inlets and tailpipes are clear, the access panels are secured, the exterior is not damaged, and the reversers are stowed
- The doors and access panels that are not in use are latched
- The probes, vents, and static ports are clear and not damaged
- The skin area adjacent to the pitot probes and static ports is not wrinkled
- The antennae are not damaged
- The light lenses are clean and not damaged

Left Forward Fuselage

Probes, sensors, ports, vents, and drains (as applicable) .Check

Doors and access panels (not in use)..........................Latched

Oxygen pressure relief green disc...............................In place

Forward outflow valve ....Check

Nose

Radome ....Check

Diverter strips – Secure

Forward access door .... Secure

Nose Wheel Well

Tires and wheels...Check

Gear strut and doors ....Check

Nose wheel steering assembly ....Check

Gear pin.. As needed

Nose gear towing lever...NORMAL

Nose gear towing lever pin .... Verify removed

Exterior lights ....Check

Wheel well light switches..................................... As needed

Forward E and E door.. Secure

Right Forward Fuselage

Probes, sensors, ports, vents, and drains (as applicable) .Check

Doors and access panels (not in use)...........................Latched

Negative pressure relief vents.....................................Closed

Right Wing Root, Pack, and Lower Fuselage

Probes, sensors, ports, vents, and drains (as applicable) .Check

Exterior lights..Check

Pack inlet and pneumatic access doors .... Secure

Leading edge flaps..Check

Right Engine

Access panels...Latched

Probes, sensors, ports, vents, and drains (as applicable) .Check

Fan blades, probes, and spinner..................................Check

Thrust reverser..Stowed

Exhaust area and tailcone...Check

Right Wing and Leading Edge

Access panels .... Latched

Leading edge slats .... Check

Fuel measuring sticks .... Flush and secure

Wing Surfaces .... Check

Note : Takeoff with light coatings of frost, up to 1/8 inch (3mm) in thickness on lower wing surfaces due to cold fuel is permissible.

Fuel tank vent .... Check

Right Wing Tip and Trailing Edge

Navigation and strobe lights.. Check

Static discharge wicks .... Check

Fuel jettison nozzle .... Check

Aileron, flaperon, and trailing edge flaps .... Check

Right Main Gear

Tires, brakes and wheels .... Check

Verify that the wheel chocks are in place as needed.

If the parking brake is set, the brake wear indicator pins must extend out of the guides.

Gear strut, actuators, and doors.................................... Check

Hydraulic lines .... Secure

Gear pins .... As needed

Right Main Wheel Well

Wheel well ....Check

Right Aft Fuselage

Ram air turbine door ....Check

Door and access panels (not in use) ....Latched

Probes, sensors, ports, vents, and drains (as applicable) .Check

VT-ALA - VT-ALR
Oxygen Pressure Relief Green Disc ....In Place

Tail

Vertical stabilizer and rudder.......................................Check

VT-ALJ - VT-ALR
Tail SKID..Check

Verify that the Tail SKID is not damaged.

Horizontal stabilizer and elevator..................................Check

Static discharge wicks ....Check

Strobe light ....Check

APU exhaust outlet ....Check

Left Aft Fuselage

Aft outflow valve...Check

Doors and access panels (not in use)..........................Latched

Probes, sensors, ports, vents, and drains (as applicable) .Check

Left Main Wheel Well

Wheel well ....Check

Left Main Gear

Tires, brakes and wheels ....Check

Verify that the wheel chocks are in place as needed.

If the parking brake is set, the brake wear indicator pins must extend out of the guides.

Gear strut, actuators and doors.....................................Check

Hydraulic lines .... Secure

Gear pins .... As needed

Left Wing Tip and Trailing Edge

Navigation and strobe lights...Check

Static discharge wicks ....Check

Aileron, flaperon, and trailing edge flaps ....Check

Fuel jettison nozzle ....Check

Fuel tank vent ....Check

Left Wing and Leading Edge

Wing Surfaces ....Check

Note : Takeoff with light coatings of frost, up to 1/8 inch (3mm) in thickness on lower wing surfaces due to cold fuel is permissible.

Fuel measuring sticks...................................Flush and secure

Fuel tank vent ....Check

Leading edge slats ....Check

Access panels .... Latched

Left Engine

Exhaust area and tailcone .... Check

Thrust reverser .... Stowed

Probes, sensors, ports, vents, and drains (as applicable) . Check

Access panels .... Latched

Fan blades, probes, and spinner .... Check

Left Wing Root, Pack, and Lower Fuselage

Probe, sensors, ports, vents, and drains (as applicable)... Check

Exterior lights .... Check

Pack inlet and pneumatic access doors .... Secure

Negative pressure relief vents .... Closed

Positive pressure relief valves....................................... Closed

Leading edge flaps .... Check

CDU PREFLIGHT PROCEDURE

CAPTAIN OR FIRST OFFICER

Initial Data .... **Set**

IDENT page :

Verify MODEL, ENGINE RATING, NAV database ACTIVE date range is current

POS INIT page: Verify time is correct.

Enter present position, on SET INERTIAL POS line. (Preferably use GPS position)

Navigation Data .... **Set**

RTE page: Enter Route (Company Route, if available & Flight Number (e.g. AIC 187)*. Verify route, Activate and Execute.

DEPARTURES page: Select R/W & SID. Check LEGS Pages as needed to ensure compliance with Flight Plan. Resolve, if any discontinuity. Execute.

Verify or enter the correct RNP for the departure.

PROGRESS Page – x-check distance with flight plan

NAV RADIO page: Tune nav radios as required.

Performance Data .... **Set**

PERF INIT page : Reserves (ALTN + HOLD), Cruise F/L, Company defined Cost Index, step size depending on route, CRZ CG (30%)

THR LIM page : Assumed Temperature / Full Thrust

VT-ALA-ALR – Select APU to Pack Mode, if needed.

TO REF Page 2: Surface Winds, R/W slope.

Single Engine acceleration height : 1000 ft AGL

(**For Acceleration height and Thrust reduction height, refer to current Company Policy**)

Acceleration Height (1000 ft AGL) or Airfield specific

Thrust reduction height: Flaps 1.

(*i. At airports where special local procedures require otherwise.*

ii. Some of the shorter SIDs also have minimum altitude constraints, which if not adhered to, will result into longer departures, thereby resulting into more fuel burn.

iii Frankfurt (FRA), Paris (CDG) and Tokyo (NRT) - Thrust reduction and acceleration altitude at 1500' and 3000' respectively.

iv London (LHR) - Thrust reduction and acceleration altitude at 1000' and 4000' respectively.

v Mumbai (BOM) - Thrust reduction at 1000' and acceleration at 3000' due to SID restrictions.)

TO REF Page 1: Take off flaps 5/15 or 20
(Flaps 5 to be used unless otherwise required due to aircraft performance, specific airport restrictions, payload, etc.)

In case of intersection departure, insert a valid R/W intersection identifier in either alphanumeric characters or distance.
Select REF SPDS ON.

Insert winds on Route data page for correct fuel predictions.
Note : Insert winds as per flight plan . Manually insert STEP CLIMB on LEGS page, taking into account difference in Expected Takeoff Weight and Actual Takeoff Weight. Enter Way point winds if difference in wind direction is >30 ° or wind speed is >30 Kts.#
Select PERF INIT page for Trim Sheet entry.

* As per filed ATC Flight Plan i.e. AIC 187 and not AI 187 to meet the mode 'S' requirement of ATC.

\# It is preferable to insert winds at FIR waypoints, since these waypoints are definitely over flown. Other waypoints may be removed DIRECT TO clearance. If Abeam waypoints are not selected, wind data are lost.

PREFLIGHT PROCEDURES

CAPTAIN	FIRST OFFICER
MANUAL OPERATION OF SEAT..............CHECK	**MANUAL OPERATION OF SEAT....................CHECK** **THRUST ASYMMETRY COMPENSATION** Switch ....**AUTO** Verify that the OFF light is extinguished. **PRIMARY FLIGHT COMPUTERS DISCONNECT** switch ....**Guard closed** Verify that the DISC light is extinguished. **ELECTRICAL** panel ....**Set** **BATTERY** switch ....**ON** Verify that the OFF light is extinguished. VT-ALA - VT-ALR **IFE/PASS SEATS POWER** Switch ....**ON** Verify that the OFF light is extinguished. VT-ALA - VT-ALR **CABIN / UTILITY POWER** Switch ....**ON** Verify that the OFF light is extinguished. **APU GENERATOR** switch **ON** Verify that the OFF light is extinguished.

CAPTAIN	FIRST OFFICER
	BUS TIE switches........**AUTO** Verify that the ISLN lights are extinguished. **GENERATOR CONTROL** Switches.........................**ON** Verify that the OFF lights are illuminated. Verify that the DRIVE lights are illuminated. **BACKUP GENERATOR** switches..........................**ON** The OFF lights stay illuminated until the respective engine is started. **APU** selector (as needed).................**START, release to ON** Do not allow the APU selector to spring back to the ON position. Verify that the FAULT light is extinguished. **L WIPER** selector............. **OFF** VT-ALA - VT-ALR **ELT** Switch.................**Guard closed** **EMERGENCY LIGHTS** Switch................**Guard closed**

CAPTAIN	FIRST OFFICER
	SERVICE INTERPHONE Switch............................ **OFF** VT-ALA - VT-ALR Note : Do not set the PASSENGER OXYGEN Switch to ON. The Switch causes deployment of the Passenger Oxygen Masks. VT-ALA - VT-ALR **PASSENGER OXYGEN** Switch............. **Guard closed** VT-AIJ - VT-AIR Note : Do not push the PASSENGER OXYGEN switch. The switch causes deployment of the passenger oxygen masks. VT-AIJ - VT-AIR **PASSENGER OXYGEN ON** Light......**Verify extinguished** **WINDOW HEAT** switches...........................**ON** Verify that the inoperative lights are extinguished.

CAPTAIN	FIRST OFFICER
	WARNING: Do not push the RAM AIR TURBINE switch. The switch causes deployment of the ram air turbine. **RAM AIR TURBINE UNLOCKED** light ....**Verify extinguished** **HYDRAULIC** panel........... **Set** **LEFT and RIGHT ENGINE PRIMARY** pump switches**ON** Verify that the FAULT lights are illuminated. **Center 1 and Center 2 ELECTRIC PRIMARY** pump switches .... **OFF** Verify that the FAULT lights are illuminated. **DEMAND pump** selectors........................OFF Verify that the FAULT lights are illuminated. **PASSENGER SIGNS** panel .... **Set** **NO SMOKING** selector...**ON** **Lighting** panel................. **Set** **OVERHEAD panel** light control ....**Mid position**

CAPTAIN	FIRST OFFICER
	CIRCUIT BREAKER panel light control ...... **Mid position** **MASTER BRIGHTNESS** Control ....As needed **GLARESHIELD** PANEL light Control............**Mid position** **FLOOD** light control............**Mid position** **LANDING** light switches .... **OFF** **APU fire** panel .... **Set** Verify that the APU BTL DISCH light is extinguished. **APU fire** switch .... **In** Verify that the APU fire warning light is extinguished. **CARGO FIRE** panel .... **Set** **CARGO FIRE ARM** switches ....**Off** Verify that the FWD and AFT fire warning lights are extinguished. Verify that the cargo fire DISCH light is extinguished. **ENGINE** panel................. **Set** **EEC MODE** switches **NORM**

CAPTAIN	FIRST OFFICER
	START/IGNITION selectors .... **NORM** **AUTOSTART** switch.......**ON** Verify that the OFF light is extinguished. **FUEL JETTISON** panel .... **Set** **FUEL JETTISON NOZZLE** Switches ....**Off** Verify that the VALVE lights are extinguished. **FUEL TO REMAIN** selector...........................**IN** **FUEL JETTISON ARM** switch............................**Off** Verify that the FAULT light is extinguished. **FUEL** panel...................... **Set** **CROSSFEED** switches .. **OFF** Verify that the VALVE lights are extinguished. **FUEL PUMP** switches... **OFF** Verify that the left forward pump PRESS light is extinguished if the APU is on or is illuminated if the APU is off. Verify that the other left and right pump PRESS lights are illuminated. Verify that the center pump PRESS lights are extinguished.

CAPTAIN	FIRST OFFICER
	VT-ALD - VT-ALE **AUXILIARY FUEL** Switch .... **OFF** Verify that Auxiliary Fuel Switch PRESS Light is extinguished. **ANTI-ICE** panel .... **Set** **WING** anti-ice selector**AUTO** **ENGINE** anti-ice selectors .... **AUTO** **Lighting** panel .... **Set** **BEACON** light switch .... **OFF** **NAVIGATION** light switch............................**ON** **LOGO** light switch..................As needed LOGO light should be kept ON during night conditions. **WING** light switch..................As needed **INDICATOR LIGHTS** switch..................As needed **RUNWAY TURNOFF** light Switches .... **OFF** **TAXI** light switch .... **OFF** **STROBE** light switch .... **OFF**

CAPTAIN	FIRST OFFICER
	AIR CONDITIONING panel................................**Set** **EQUIPMENT COOLING** switch ....**AUTO** Verify that the OVRD light is extinguished. **GASPER** switch ....**ON** **RECIRCULATION FANS** switches ....**ON** **FLIGHTDECK TEMPERATURE** Control ....**mid AUTO** position **CABIN TEMPERATURE** control...............**Mid** position **PACK** switches ....**AUTO** Verify that the OFF lights are extinguished. **TRIM AIR** switches ....**ON** Verify that the FAULT lights are extinguished. **BLEED AIR** panel..............**Set** **LEFT. CENTER and RIGHT ISOLATION** Switches.....................**AUTO** Verify that the CLOSED lights are extinguished.

CAPTAIN	FIRST OFFICER
	ENGINE bleed switches ....**ON** The OFF lights stay illuminated until the respective engine is started. **APU** bleed switch ...... **AUTO** Verify that the OFF light is extinguished. **PRESSURIZATION** panel **Set** **OUTFLOW VALVE** switches .... **AUTO** Verify that the MAN lights are extinguished. **LANDING ALTITUDE** selector ....**IN** **R WIPER** selector .... **OFF** VT-AIJ - VT-AIR **OBSERVER AUDIO ENTERTAINMENT** switch .... **OFF** **FLIGHT DIRECTOR** switch ....**ON** **Display select** panel........ **Set** **LOWER CENTER** display switch ....**Push**

CAPTAIN	FIRST OFFICER
EFIS control panel ....**Set**	**EFIS control** panel .... **Set**
MIMIMUMS reference selector... **RADIO or BARO**	**MIMIMUMS** reference selector ...**RADIO or BARO**
MINIMUMS selector ....**Set** Note: Set the decision height/ altitude of the active landing runway. Set and deselect to avoid clutter.	**MINIMUMS** selector ... **Set** Note: Set the decision height/ altitude of the active landing runway. Set and deselect to avoid clutter.
FLIGHT PATH VECTOR switch .... **As needed**	**FLIGHT PATH VECTOR** Switch ....**As needed** Note : Selected ON in case of anticipated windshear on takeoff.
METERS switch...........**OFF** (May be selected 'ON' as per ATC requirement.)	**METERS** switch .... **OFF** (May be selected 'ON' as per ATC requirement.)
BAROMETRIC reference Selector ....**IN or HPA**	**BAROMETRIC** reference Selector .... **IN or HPA**
BAROMETRIC selector **Set** Local altimeter setting	**BAROMETRIC** selector **Set** Local altimeter setting
VOR/ADF switches........... **As needed**	**VOR/ADF** switches ....**As needed**
ND mode selector......**MAP**	**ND** mode selector ...... **MAP**

CAPTAIN	FIRST OFFICER
ND CENTER switch .... **As needed** **ND range** selector .... **As needed** **ND TRAFFIC** switch .... **ON** TCAS OFF message displayed on ND. **WEATHER RADAR** ...... **Off** Verify that the weather radar indications are not shown on the ND. **Map** switches...... **As needed** **Mode control** panel........**Set** FLIGHT DIRECTOR switch ....ON AUTOTHROTTLE ARM switches......................ARM Autopilot DISENGAGE barUP HEADING/TRACK reference switch .... HDG	**ND CENTER** switch .... **As needed** **ND range** selector .... **As needed** **ND TRAFFIC** switch .... **ON** TCAS OFF message displayed on ND. **WEATHER RADAR** ..... **Off** Verify that the weather radar indications are not shown on the ND. **Map** switches... **As needed**
BANK LIMIT selector .... AUTO VERTICAL SPEED/FLIGHT PATH ANGLE Reference switch ....As needed ALTITUDE increment selector..............As needed	

CAPTAIN	FIRST OFFICER
Oxygen ....Test and set	**Oxygen ....Test & set**
VT-AIJ - VT-AIR Oxygen mask.......... Stowed and doors closed	VT-AIJ - VT-AIR Oxygen mask ....Stowed and doors closed
RESET/TEST switch .... Push and hold Verify that the yellow cross shows momentarily in the flow indicator	RESET/TEST switch .... Push and hold Verify that the yellow cross shows momentarily in the flow indicator.
EMERGENCY/TEST selector........ Push and hold Continue to hold the RESET / TEST switch down & push the EMERGENCY / TEST selector. Verify that the yellow cross shows continuously in the flow indicator.	EMERGENCY/TEST selector .... Push and hold Continue to hold the RESET / TEST switch down & push the EMERGENCY / TEST selector. Verify that the yellow cross shows continuously in the flow indicator.
Release the RESET / TEST switch and the EMERGENCY / TEST selector. Verify that the yellow cross does not show in the flow indicator.	Release the RESET / TEST switch and the EMERGENCY / TEST selector. Verify that the yellow cross does not show in the flow indicator.
Normal/100% selector.. 100%	Normal / 100% selector 100%
VT-AIJ - VT-AIR Crew Oxygen Pressure......... Check EICAS Verify that the pressure is sufficient for dispatch.	VT-AIJ - VT-AIR Crew Oxygen Pressure ....Check EICAS Verify that the pressure is sufficient for dispatch.

CAPTAIN	FIRST OFFICER
VT-ALA - VT-ALR Crew and Passenger Oxygen Pressure......... Check EICAS Verify that pressure is sufficient for dispatch. Note: The oxygen mask microphone can be tested without removing it from the storage box. • Select the FLIGHT interphone transmitter and set the speaker volume as desired. • Push and hold a MIC switch on either the audio control panel or the glare shield • Push both the oxygen mask RESET / TEST switch & EMERGENCY / TEST selector	VT-ALA - VT-ALR Crew and Passenger Oxygen Pressure ....Check EICAS Verify that pressure is sufficient for dispatch. Note: The oxygen mask microphone can be tested without removing it from the storage box. • Select the FLIGHT interphone transmitter and set the speaker volume as desired. • Push and hold a MIC switch on either the audio control panel or the glare shield • Push both the oxygen mask RESET / TEST switch & EMERGENCY/ TEST selector

OXYGEN TEST PROCEDURE : ALA ONWARDS

Crew oxygen pressure ....Check
Verify that the pressure is sufficient for dispatch.
Oxygen mask .... Stowed and doors closed
TEST/RESET switch.......................................Push and hold
Verify that the yellow cross shows momentarily in the flow indicator.
Regulator selector..Rotate to EMER
Continue to hold the TEST/RESET switch down with the regulator selector in the EMER position for 5 seconds.

Verify that the yellow cross shows continuously in the flow indicator.

Verify that the crew oxygen pressure does not decrease more than 100 psig.

If the oxygen cylinder valve is not in the full open position,
pressure can:

- decrease rapidly, or
- decrease more than 100 psig, or
- increase slowly back to normal.

Release the TEST/RESET switch and rotate the regulator selector to 100%. Verify that the yellow cross does not show in the flow indicator.

Oxygen Mask Microphone Test

FLT INT switch. .... Push
SPKR switch .... On
TEST/RESET switch ....Push and hold
Regulator selector..Rotate to EMER
Push-to-Talk switch ....I/C

Simultaneously push the Push-to-Talk switch and the TEST/ RESET switch with the regulator selector in the EMER position. Verify oxygen flow sound is heard through the flight deck speaker.

Push-to-Talk switch.. Release
Regulator selector... Rotate to 100%
TEST/RESET switch .... Release
SPKR switch .... As needed

Crew and Passenger Oxygen
Pressure......... Check EICAS

Verify that pressure is sufficient for dispatch.

- Crew must ensure that spectacles if used should be such that they can be accommodated under the smoke goggles.
- Large spectacle frames cannot be accommodated.
- Oxygen Mask may not seal properly due to a beard.

CAPTAIN	FIRST OFFICER
The sound of oxygen flowing is heard through the speaker, verifying microphone operation. **Flight deck windows..Closed & locked** Verify that the WINDOW NOT CLOSED decal does not show. Verify that the orange indicator does **not** show. VT-ALA - VT-ALR **ELECTRONIC FLIGHT BAG .... Set** **FORWARD PANEL BRIGHTNESS Controls ....Mid position** Note: Weather radar brightness control to be adjusted to MAX position. **Instrument source select** panel .... **Set** **NAVIGATION** source switch ....**Off** **DISPLAY CONTROL** source switch .... Off **AIR DATA / ATTITUDE** source switch ....**Off**	The sound of oxygen flowing is heard through the speaker, verifying microphone operation. **Flight deck windows... Closed & locked** Verify that the WINDOW NOT CLOSED decal does not show. Verify that the orange indicator does **not** show. VT-ALA - VT-ALR **ELECTRONIC FLIGHT BAG...............................Set** **FORWARD PANEL BRIGHTNESS controls ....Mid position** Note: Weather radar brightness control to be adjusted to MAX position. **Instrument source select** panel...............................**Set** **NAVIGATION** source switch...........................**Off** **DISPLAY CONTROL** source switch...........................**Off** **AIR DATA/ ATTITUDE** source switch ....**Off**

CAPTAIN	FIRST OFFICER
Clock* .... **Check / Set** * The clock displays AIMS generated UTC time which is obtained from the GPS. **Time/date** selector.....**UTC** (Check time and date)	**Clock*** ....**Check/Set** * The clock displays AIMS generated UTC time which is obtained from the GPS. **Time/date** selector.... **UTC** (Check time and date)
INBOARD DISPLAY selector.......................... **MFD** **HEADING REFERENCE** switch......................... **NORM**	**INBOARD DISPLAY** selector..........................**MFD** MFD – displays the selection made on the display select panel. **FMC** Selector...............**AUTO**
Confirm the Initial Data and Navigation Data steps from the CDU Preflight Procedures are complete and verify that the IRS alignment is complete before checking the flight instruments.	Confirm the Initial Data and Navigation Data steps from the CDU Preflight Procedure are complete and verify that the IRS alignment is complete before checking the flight instruments.
Flight instruments... **Check** Verify that the flight instrument indications are correct Verify that only these flags are shown : • TCAS OFF • NO VSPD until takeoff V-speeds are selected.	**Flight instruments**...**Check** Verify that the flight instrument indications are correct Verify that only these flags are shown : • TCAS OFF • NO VSPD until takeoff V-speeds are selected.

CAPTAIN	FIRST OFFICER
Verify that the flight mode annunciations are correct : • autothrottle mode is blank • roll mode TO/GA • pitch mode is TO/GA • AFDS status is FLT DIR Select the map mode.	Verify that the flight mode annunciations are correct : • autothrottle mode is blank • roll mode TO/GA • pitch mode is TO/GA • AFDS status is FLT DIR Select the map mode.
VT-AIJ - VT-AIR **Standby instrumentsCheck** Set local altimeter setting. Verify that the flight instrument indications are correct. Set V1 on Stby ASI Verify that no flags are shown. Verify not blank VT-ALA - VT-ALR **Integrated Standby Flight Display ....Set** Verify that the Approach Mode Display is blank. Set local altimeter setting. Verify that flight instrument indications are correct. Verify that no flags or messages are shown. **ALTERNATE PITCH TRIM levers .... Neutral** **SPEEDBRAKE lever. DOWN**	**Landing gear** panel....... **Set** Verify that the GND PROX light is extinguished. **FLAP OVERRIDE** switch .... **Off** **GEAR OVERRIDE** switch**Off** **TERRAIN OVERRIDE** switch .... **Off** **Landing gear** lever...... **DN** **ALTERNATE GEAR** switch ....**Guard closed** **AUTOBRAKE** selector.... **RTO** **EICAS display**........... **Check** Verify that the primary engine indications show existing conditions. Verify that no exceedance is shown by pressing CANC / RCL Sw.

CAPTAIN	FIRST OFFICER
Reverse thrust leversDown **Forward thrust levers** .... **Closed** **Flap lever** .... **Set** The flap position indicator does not show when the flaps are up. Set the flap lever to agree with the flap position after confirming with AME, in case of mismatch. **Parking brake** .... **Set** Verify that the PARKING BRAKE SET message is shown. Note : Do not assume that the parking brake will prevent airplane movement. Accumulator pressure can be insufficient.	
STABILIZER cutout switches........**Guards closed** **FUEL CONTROL** switches.................**CUT OFF** **FUEL CONTROL switch fire warning lights** .... **Verify Extinguished**	**MFD**............................**Check** **Secondary ENGINE indications** ....**Check** Verify that the secondary engine indications show existing conditions. Verify that no exceedance is shown.

CAPTAIN	FIRST OFFICER
ALTERNATE FLAPS panel .... **Set** ALTERNATE FLAPS ARM switch .... OFF ALTERNATE FLAPS selector .... OFF	**Select** the status display **Status** messages . **Check** **CHECKLIST** display switch........................... **Push** LOWER CENTER cursor location switch........... **Push** Verify that the lower center location light is illuminated. **RESETS** .... **Select** (SELECTING OF RESET MENU) VT-AIJ - VT-AIR Verify the AIRLINE DATABASE is current. **RESET ALL** .... **Select** RESETS ALL NORM & N/N C/L. **CAUTION:** Use of RESET ALL function inflight is not recommended. VT-AIR **COMMUNICATION Display** Switch .... **Push** **MANAGER**................ **Select** **MASTER** .... **Select** **DATA LINK SYSTEM RESET .... SELECT** **CONFIRM RESET** ..... **Select**

CAPTAIN	FIRST OFFICER
	Center DISPLAY CONTROL source switch ....**Off** **CENTER PANEL BRIGHTNESS** controls............ **Mid position** **Left radio tuning** panel.. **Set** Verify that the OFF light is extinguished. VHF 'L' = Delivery/ Ground/ Tower VHF 'R' = Company / ATIS /121.5 VHF 'C' = DATA (on ground before chocks off)* **Since Co. freq/ ATIS is not required for a prolonged period of flight, this set can be switched from "Data: to Co. freq or ATIS when required. During these short periods it is acceptable that ACARS will auto switch to SATCOM.* **L HF** : Set MWARA / RADRA Note: When more than one, VHF/HF sets are used for communication simultaneously, crew are required to wear the headsets as simultaneous transmission/ reception reduces the speaker volume.

CAPTAIN	FIRST OFFICER
	SELCAL Check...(after fuelling is completed)............. Perform **WEATHER RADAR** panel **Set** **Weather radar mode** Selector......... **TEST** position **TILT** control / Mode sel .... **+ 5°/AUTO** **GAIN** control .... **AUTO** or As reqd. SYS switch................... L / R (select L for odd flight numbers; R for even flight numbers) **Engine fire** panel ....**Set** Verify that the ENG BTL 1 DISCH and ENG BTL 2 DISCH lights are extinguished. **Engine fire** switches ...... **In** Verify that the LEFT and RIGHT fire warning lights are extinguished. **Center CDU**.......**MENU**....**Set** **Flight deck printer**.........**Set** Verify that the PAPER light is extinguished. **Right radio tuning panel**..............................**Set** Verify that the OFF light is extinguished.

CAPTAIN	FIRST OFFICER
Captain's audio control panel .... **As needed** VHF L. C. R FLT & SPKR Rx volume Ctl Switch manually select ON. Adjust volume as desired. All other Rx volume controls to be at minimum position. VOR / ADF Rx selector: select as needed	**First officer's audio control** panel.................... **As needed** VHF L. C. R FLT & SPKR Rx volume Ctl Switch manually select ON. Adjust volume as desired. All other Rx volume controls to be at minimum position. VOR / ADF Rx selector: select as needed **Transponder** panel .... **Set** Set Squawk – 2000 if no other code given Keep 'STBY' Enter the discrete mode A code received from the ATC. Also enter the Airline 3-letter ICAO designator with the flight number in the FMC, eg.,AIC141 This will prepare the Transponder to start exchanging data without delay when needed. **Evacuation COMMAND** Switch .... **Guard closed**
WARNING: Do not put objects between the seat and the aisle stand. Injury can occur when the seat is adjusted.	**FLOOR LIGHTS** switch .... **As needed** **OBSERVER AUDIO** selector .... **NORM**

CAPTAIN	FIRST OFFICER
	AISLE STAND PANEL light control...............**Mid position** **AISLE STAND FLOOD** light control...............**Mid position** WARNING: Do not put objects between the seat and the aisle stand. Injury can occur when the seat is adjusted.
Seat......................... **Adjust** Adjust the seat for optimum eye reference. The seat should be adjusted to the optimum high position with the back upright looking straight ahead the top of the glare shield appears as the edge of the plane and the cross hairs on the top of the rudder pedal adjustment crank housing liner with the top of the control column. The control column must be in the neutral position.	**Seat** ....**Adjust** Adjust the seat for optimum eye reference. The seat should be adjusted to the optimum high position with the back upright looking straight ahead the top of the glare shield appears as the edge of the plane and the cross hairs on the top of the rudder pedal adjustment crank housing liner with the top of the control column. The control column must be in the neutral position.
Rudder pedals .... **Adjust** Adjust the rudder pedals to allow full rudder pedal and brake pedal movement. <u>**Stow**</u> the rudder pedal adjust crank.	**Rudder pedals**.........**Adjust** Adjust the rudder pedals to allow full rudder pedal and brake pedal movement. <u>**Stow**</u> the rudder pedal adjust crank.

CAPTAIN	FIRST OFFICER
Seat belt and shoulder harness.................... Adjust CALL "PREFLIGHT CHECKLIST."	**Seat belt and shoulder harness.................... Adjust** DO PREFLIGHT CHECKLIST on the captain's command. Call **"PRE FLIGHT CHECK LIST COMPLETED"** Note: After preflight checklist is completed, select STATUS on lower EICAS.

CAPTAIN'S BRIEFING :

The purpose of the Capt.'s briefing is to inform the other crewmembers about the planned course of action for both normal and Non-normal situations during T/O. This should be done any time when work load is low, prior to engine start and when T/O conditions are known.

It is the time for the Capt. to give any specific instructions considering the following :-

Runway state, use of Anti ice, wipers.

Packs ON / OFF / APU to Pack Takeoff for (Refer FCOM Vol. 1 Supplementary Procedures) –

One engine inoperative Accel ht, thrust reduction height:-

X-check settings: date, time, HDG, speed, QNH, Alt & Nav Rad.

Discuss parked posn, direction of Push Back, expected Taxi Rte, MEL / NOTAMS.

Use of Wx Radar/ TERR display.

SID routing / altitudes (All hard altitude climb resctricitions, including "at or below" constraints should be set in the MCP window. The next altritude may be set when the restriction has been satisfied or further clearance has been received.) and specific tuning of Nav aids, MCP selections, flaps and thrust.

Normal accel Alt., Transition Alt.; Consider high ground, MSA, GRID MORA, MEA, SPD and ALT restriction and Noise Abatement Procedures.

Action in event of immediate return or diversion after T/O. including fuel jettison, overweight landing.

Review :-

a) Rejected Takeoff from Maneuvers Chapter of the QRH.
b) Evacuation from back cover 2 of the QRH

Note :- Crew should select PLAN mode and range 10 Nm on the MFD, while reviewing the SID. The PF should read out the SID while the PM should scroll and check on the FMS CDU and ND.

BEFORE START PROCEDURE :-

In case the assumed temperature for T/O is re inserted or if RWY is changed the 'NO V SPD' flag will appear, the speeds must be re-confirmed.

In case the Electrical Power trips at any time the MCP must be checked for tripping to default values. The AUTOBRAKES RTO selection also must be checked as it trips to ‘OFF’.

CAPTAIN	FIRST OFFICER
On receiving the TRIM SHEET the Captain to read out the ZFW, T/O weight, T/OCG, TRIM and POB.	The F/O to note the ZFW,T/O weight, T/OCG, TRIM and POB on the T/O data card.
CDU.............................. Set	**CDU ....Set**
Note: The following steps to be performed by the Captain and confirmed by the First Officer.	Note: The following steps to be performed by the Captain and confirmed by the First Officer.
INIT REF key – Push	INIT REF key – Push
Verify total fuel quantity requirement by comparing EICAS/ CDU.	Verify total fuel quantity requirement by comparing EICAS/ CDU.
Enter : Zero fuel weight.	X-chk : Zero fuel weight.
Verify T/O weight confirms with Trim sheet weight minus taxi fuel.	Verify T/O weight confirms with Trim sheet weight minus taxi fuel.
THRUST LIM line select key – Push	THRUST LIM line select key – Push
X-chk takeoff thrust : • Full thrust • Assumed temperature.	X-chk takeoff thrust : • Full thrust • Assumed temperature.

CAPTAIN	FIRST OFFICER
X-chk climb thrust	With reduced thrust, maintain the FMC defaulted derate CLB THR to further enhance engine life, unless a higher change is required due ATC/Wx.`
TAKEOFF line select key – Push	TAKEOFF line select key – Push
Enter T/O CG.	Enter T/O CG.
Enter / Confirm takeoff speeds	Enter / Confirm takeoff speeds. LEGS page .... SELECT
MCP..............................**Set**	
IAS/MACH selector-Set V2 Arm LNAV as needed. Arm VNAV. R/W HDG.........confirm/set Initial altitude...confirm/set	
Aircraft acceptance ....Sign	
Note: The documents should be signed in the following order with correct time in UTC. 1) Trim sheet and DG, if any 2) aircraft acceptance 3) Aircraft release certificate.	
IFS to confirm all papers and documents on board thereafter Capt to sign aircraft release certificate.	

CAPTAIN	FIRST OFFICER
Start clearance .... **Obtain** On obtaining start up clearance, Call for **“BEACON ON”** Coordinate with Ground personnel for clearance to pressurize hydraulic systems. **“Ground confirm aircraft clear, all doors closed, Nose gear steering locked out & confirm cleared to pressurize the hydraulics?”** On an **affirmative** from the ground crew ask them to : **“STANDBY FOR PUSHBACK”** then call for – “**BEFORE START PROCEDURE**“	**Start clearance**....... **Obtain** **BEACON**........................ **ON** **Hydraulic panel**............ **Set** Warning: If the tow bar is connected, do not pressurize the hyd Sys until the nose gear steering is locked out. Unwanted tow bar movement can occur. (Note: Pressurize the Right sys first to prevent fluid transfer between Systems.) Right ELEC.DEMAND pump selector—AUTO Verify that FAULT light is extinguished. C1 and C2 ELEC. PRI.

CAPTAIN	FIRST OFFICER
	Pump switches—ON (C2 Fault light may remain ill. till after start due load shed.) Left ELEC. DEMAND pump selector—AUTO C1 and C2 AIR DEMAND pump selector—AUTO Note: Verify all above fault lights ext.
Trim ....Set Set Stab. trim for T/O and verify in green band. Aileron and Rudder trim check 0 units.	**Fuel panel.................... Set** **LEFT & RIGHT FUEL PUMP** Switches .... **ON** Verify that PRESS lights are extinguished. VT-AIJ - VT-AIR If there is fuel in the center tank. CENTER FUEL PUMP Switches .... ON One or both PRESS lights may stay illuminated until after the engine start because of load shedding. VT-ALA - VT-ALR If there is more than 4,800 Kgs of fuel in the Center tank. CENTER FUEL PUMP Switches .... ON One or both PRESS lights may stay illuminated until after the engine start because of load shedding.

CAPTAIN	FIRST OFFICER
	VT-ALD, VT-ALE If there is more than 100 Kgs of fuel in the auxiliary tank AUXILIARY FUEL Switch .... ON Verify that the PRESS light is extinguished. Note : Failure to push the Auxiliary Fuel Switch ON may result in unusable fuel. **SEAT BELTS** selector ... **ON** **Exterior Doors**...............**Verify closed** Note : Doors to be verified closed by selecting the door synoptics.
FLIGHT DECK WINDOWS ... . CLOSED AND LOCKED	**FLIGHT DECK WINDOWS ... . CLOSED AND LOCKED** **CANCEL / RECALL** switch ....**Push** Verify only expected alert msgs shown and push again to cancel msgs
Captain to ensure doors automatic call carried out by the F/O and the IFS to come to cockpit to confirm doors are in automatic mode and select the FLT DECK DOOR ACCESS Switch to Norm before closing the door.	**"Cabin Doors automatic x-check & confirm"**

CAPTAIN	FIRST OFFICER
CALL "**BEFORE START CHECKLIST**"	
	DO **BEFORE START CHECKLIST.** On completion, "BEFORE START CHECK LIST Completed"

PUSH BACK OR TOWING PROCEDURE

CAPTAIN	FIRST OFFICER
Ask the First Officer to obtain Push back clearance, if not obtained earlier. "**Ground we are cleared to pushback facing** ________ "	Call ATC for pushback clearance. **Transponder .... As Reqd** **(If not done earlier)** **ALA-ALR** Note: At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting (ALT ON), but not a TCAS mode. **AIJ-AIR** Note: At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting (XPNDR), but not a TCAS mode.

CAUTION : 1) Do not hold or turn the nose wheel tiller during pushback or towing. This can damage the nose gear or the tow bar.

2) Do not use airplane brakes to stop the airplane during pushback or towing. This can damage the nose gear or the tow Bar. (Crew should not have their feet on the rudder pedals during Pushback.)

<table>
<tr><th>CAPTAIN</th><th>FIRST OFFICER</th></tr>
<tr><td colspan="2">TRANSPONDER...AS NEEDE
At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting, but not a TCAS mode.</td></tr>
<tr><td>Parking brake to be released as directed by ground handling personnel.

PARKING BRAKE ....RELEASI
Inform ground personnel “parking brake released”</td><td></td></tr>
</table>

When pushback or towing is completed:

CAPTAIN	FIRST OFFICER
Parking brake to be set as directed by ground handling personnel. **Parking brake** .... **Set** Inform ground personnel “parking brake set”	

ENGINE START PROCEDURE

CAPTAIN	FIRST OFFICER
On obtaining the clearance to start engines from ground personnel, **Start sequence Right / Left** ....**Announce**	
Engines may be started during Push back / towing. Engines will be started at a time only. "START Right / Left ENGINE"	Select the secondary engine display.
FUEL CONTROL switch.**RUN**	**Engine START/IGNITION** selector ....**START**
Verify that the oil pressure increases. Call "Oil pressure L/R increase". <u>Verification of oil pressure is required as it is not monitored by the AUTO START</u>. Do the ABORTED ENGINE START Recall procedure followed by checklist if there is no oil pressure indication after the EGT increases. Call out "R/L Engine Stabilized" when EGT max start limit line display is removed.	Verify that the oil pressure increases.

AUTOSTART corrects for:

- no EGT rise
- a hot start
- a hung start
- no N1 rotation
- a compressor stall
- a starter shaft failure
- insufficient starter air pressure
- a start time that exceeds the maximum starter duty cycle time

In case the AUTO START fails to start the engine do the 'ENG AUTOSTART' Recall procedure followed by checklist.

BEFORE TAXI PROCEDURE

The procedure is to be completed once both engines have stabilized

CAPTAIN	FIRST OFFICER
CALL “**BEFORE TAXI PROCEDURE**”	
Captain calls for “Before Taxi Procedure” and tells ground to______ “**Remove all external sources, verify Nose Gear steering not locked, hand signals on left/ right, chocks off time____________Z**”	**APU** selector.................. **OFF** **ENGINE ANTI-ICE** selectors............ **As required**
Note : Cold weather operation may call for flaps selection when on takeoff runway.	**Recall**........................**Check** Verify that only expected alert messages are shown
Verify ground equipment personnel are clear.	Verify ground equipment personnel are clear.
Call “**FLAPS ___**” as needed for takeoff	**Flap lever** **Set take off flaps**
Flight controls ....**Check** Note : To avoid nuisance **FLIGHT CONTROLS** faults, a complete cycle of the control wheel should be done slowly (more than approx. 6 secs.) & not combined with the check of the pitch controls.	**Transponder**.... **As required ALA-ALR** Note: At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting (ALT ON), but not a TCAS mode.

CAPTAIN	FIRST OFFICER
Move the control wheel and the control column to full travel in both directions and verify : • freedom of movement • that the controls return to center	**AIJ-AIR** Note: At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting (XPNDR), but not a TCAS mode. **Wx Radar mode / Sys Selector.....As required**
Hold the nose wheel tiller during the rudder check to prevent nose wheel movement. Move the rudder pedals to full travel in both directions and verify: • freedom of movement • that the rudder pedals return to center VT-ALA - VT-ALR **EFB AIRPORT MAP Application ....Select** Select maps desired. CAUTION: Do not use the Airport Map application as a primary navigation reference. The Airport Map application is designed to aid flight crew positional awareness only. Call "BEFORE TAXI CHECKLIST"	VT-ALA - VT-ALR **EFB AIRPORT MAP Application Select** Select maps desired. CAUTION: Do not use the Airport Map application as a primary navigation reference. The Airport Map application is designed to aid flight crew positional awareness only. Do the BEFORE TAXI checklist

<table>
<tr><th>Pilot Flying</th><th>Pilot Monitoring</th></tr>
<tr><td>Call for “Taxi clearance”

Update changes to the Taxi Brfg., if any

Ensure left, right and straight ahead is clear.

Ask Pilot Monitoring to select “ON” Taxi and TurnOff lights.

Do not release parking brakes until clearance obtained from Marshller from the left / right side. Captain will acknowledge this clearance by switching ON the turn off lights.

Parking Brakes...........Release</td><td>Obtain Taxi clearance

Select
Taxi and Turn-Off lights.....ON

▪ PM to guide the PF throughout the taxi phase
▪ If in doubt about taxi clearance, stop the airplane & verify with ATC before proceeding.</td></tr>
<tr><td colspan="2">In case of runway change : reselect : RWY – SID – transition – check for discontinuity – confirm – concur – execute – check spd / Alt constraints-tally LEGS pg. with the SID requirements. Work out the Assumed Temp / Thrust / speeds/ T/O data card. Reselect speeds on FMS and arm appropriate pitch and roll modes. Check ‘NO VSPD’ flag not displayed. Reselect MCP: V2/ RWY hdg / Alt. Review taxi route.</td></tr>
<tr><td>“MODES FOR DEP WILL BE ___.
TAKE-OFF THRUST _____,
FLAP SETTING_______.
STD INSTRUCTIONS, STD CALL OUTS.”

Variations if any must be discussed.</td><td></td></tr>
</table>

Pilot Flying	Pilot Monitoring
The cleared hdg after T/O must be written down; select HDG SEL after T/O not earlier than 400' AGL and then select the cleared heading in the cleared direction.	

Note : Ensure that "CABIN READY" message displayed on EICAS, prior to entering active R/W. This ensures that the IFS has verified that the cabin and galleys are secured for T/O & Flight Safety demonstration is carried out.

VT-AIJ - VT-AIR

Engine warm up requirements :

- Engine oil temperature must be above the lower amber band before takeoff

Engine warm up recommendations (there is no need to delay the takeoff for these recommendations) :

- When the engines have been shut down for more than 2 hours
- Run the engines for 5 minutes
- When taxi time is expected to be less than 5 minutes, start the engines as early as feasible
- Use a thrust setting normally used for taxi operations.

VT-ALA - VT-ALR

Engine warm up requirements :

- Engine oil temperature must be above the bottom of the temperature scale

Engine warm up recommendations :

- Run the engines for at least 3 minutes
- Use a thrust setting normally used for taxi operations

BEFORE TAKEOFF PROCEDURE

VT-AIJ – VT-AIR

Engine warm up requirements:

- engine oil temperature must be above the lower amber band before takeoff

Engine warm up recommendations (there is no need to delay the takeoff for these recommendations):

- When the engines have been shut down for more than 2 hours:
  - run the engines for 5 minutes
  - when taxi time is expected to be less than 5 minutes, start the engines as early as feasible
  - use a thrust setting normally used for taxi operations

VT-ALA – VT-ALR

Engine warm up requirements:

- engine oil temperature must be above the bottom of the temperature scale

Engine warm up recommendations:

  - run the engines for atleast 3 minutes
  - use a thrust setting normally used for taxi operations

On being cleared to enter the active runway

Pilot Flying	Pilot Monitoring
Call **"BEFORE T/O PROCEDURE."** Note: Both Pilots to ensure that the approach path and runway is clear before crossing the CAT I / CAT II & III stop bar and entering the active runway. “App path clear, R/W clear / occupied.”	Note: Both Pilots to ensure that the approach path and runway is clear before crossing the CAT I / CAT II & III stop bar and entering the active runway. **All Lights/Strobe** ....**ON** **<u>SELECT :</u>** **Weather radar display ON**......................**PF Side** **Terrain display.........ON ....PM Side** (Note : Terrain ON till 20,000' if no adverse weather) **Announce**.... **"CABIN CREW Stations for T/O"** **Transponder /TCAS.TA/RA**

Note : After line up on R/W x-chk the displayed hdg within $\underline{+}10^0$ of R/W magnetic hdg.

On obtaining T/O clearance

Pilot Flying	Pilot Monitoring
Note: It is **mandatory** to ensure T/O clearance obtained before calling C/L complete.	**Before T/O CHECK LIST………..Display** Note: It is **mandatory** to ensure T/O clearance obtained before calling T/O C/L complete, and deselecting the C/L.
“TAKEOFF CLEARANCE - OBTAINED”	**“TAKEOFF LEARANCE - OBTAINED”**
Call **“BEFORE TAKEOFF CHECKLIST”**	
“BEFORE T/O C/L COMPLETE”	**“BEFORE T/O C/L COMPLETE”**
“ELAPSED TIME – RUN”	**“ELAPSED TIME – RUN”**

TAKE-OFF PROCEDURE

Pilot Flying	Pilot Monitoring
Verify that the brakes are released.	
Align the airplane with the runway.	
VT-ALA - VT-ALR Advance the thrust levers to approximately 55% N1.	
VT-AIJ - VT-AIR Advance the thrust levers to approximately 1.05 EPR.	
Allow the engines to stabilize. Note: Allowing the engines to stabilize for more than approximately 2 seconds prior to advancing thrust levers to takeoff thrust may adversely affect takeoff distance. In case the speed exceeds 50 kts Auto throttle will not engage by pushing TOGA switch and T/O thrust will have to be set manually.	
Push the TO/GA switch. and CALL **"TAKE OFF"**	Call **"THR REF / TOGA / TOGA"**
Verify that the correct takeoff thrust is set.	Monitor Engine parameters during the take-off.
	Call out any abnormal indications.

Pilot Flying	Pilot Monitoring
	Adjust takeoff thrust before 80 knots as needed. Note: During strong headwinds of 20 kts & greater, the thrust levers may not advance to the planned takeoff thrust by 80 knots, manually advance the thrust levers.
Regardless of which pilot is performing the takeoff, the captain should keep one hand on the thrust levers until 'the call V1' in order to respond quickly to a rejected takeoff manoeuvre.	
Monitor airspeed. Maintain light forward pressure on the control column.	Monitor airspeed and call out any abnormal indications.
Verify 80 knots and call "CHECK". Relax the forward control column pressure to neutral position.	Call "80 KNOTS."
Verify V1 speed.	Verify the automatic V1 callout or call "V1".
At VR, rotate towards 15º pitch attitude. Flight director pitch command is not used for rotation. Rotation rates vary from 2 to 2.5 degrees per second. After liftoff, follow F/D commands. Establish a positive rate of climb.	At VR call "ROTATE." Monitor airspeed and vertical speed.

Pilot Flying	Pilot Monitoring
	Verify a positive rate of climb on the altimeter and call "**POSITIVE RATE".**
Verify a positive rate of climb on the altimeter and call **"GEAR UP."**	
	Set the landing gear lever to UP.
Above 400 feet RA, call for a roll mode as needed.	Select or verify the roll mode by calling out the FMA.
Verify that climb thrust is set.	Verify that climb thrust is set.
Verify acceleration at the acceleration height. Call **"FLAPS_____"** according to the flap retraction schedule.	CALL **"ACCELERATION"**
	Set the flap lever as directed while ensuring +ve acceleration.
Engage the autopilot when above the minimum altitude for autopilot. (minimum altitude is 200 ft AGL)	
	After flap retraction is complete, set the Engine Anti-Ice Selectors to AUTO if selected ON.
Call **"AFTER TAKEOFF CHECKLIST."**	Do the AFTER TAKEOFF checklist. Call **"AFTER T/O CHECKLIST COMPLETE"**
At transition altitude "set standard". Set standard.	At transition altitude: "Transition altitude" Set standard

Takeoff Flap Retraction Speed Schedule :

TO Flaps	Select Flaps	Speed (Knots)
20 or 15	5 1 UP	VREF30+20 VREF30+40 VREF30+60
5	1 UP	VREF30+40 VREF30+60

CLIMB AND CRUISE PROCEDURE:

Note: Maintain atleast 15 knots above minimum maneuver speed when climbing through FL200 to prevent the EICAS caution message, "AIRSPEED SLOW" from occurring.

Note: 200-LR / 300-ER at higher weights and Flap up configuration ensure the Aircraft speed is minimum maneuvering + 15 knots. This should be done through the speed intervention.

Pilot Flying	Pilot Monitoring
"10,000 feet climb procedure" (10,000 feet above Airport elevation)	At or above 10,000 feet above Airport elevation, set the LANDING Lights, Turn-off & Taxi light switches to OFF.
Seat belt as required.	Set the passenger seat belt sign as required, with the consent of Captain, as per Company Policy. (Refer Part C.)
At transition altitude, set and crosscheck the altimeters to standard (if transition altitude is above 10000 ft).	
	If the "FUEL IN CENTER" message shows, set both CENTER FUEL PUMP switches to ON. VT-ALD, VT-ALH When the FUEL LOW AUX message shows, set the FUEL AUX Switch to OFF. When the FUEL LOW CENTER message shows, set both CENTER FUEL PUMP Switches to OFF.
	<u>Passing 20,000'</u> COMPANY DEPARTURE MESSAGE

Pilot Flying	Pilot Monitoring
	When workload is low, inform company on VHF : • the chocks off time and the airborne time • operational status (normal or otherwise), • delay if any & cause of delay • FL cleared / likely for CRZ. • Seat Belt Sign as per Company Policy. (Refer Part C)
WEATHER RADAR ADJUST	The 'chocks off' time, given to the Flight Despatch on Company VHF after departure should be the same as the time given to ground crew after push back. **WEATHER RADAR DISPLAY .... ON** **WEATHER RADAR..ADJUST** (Terrain is automatically de-selected.) **TERRAIN DISPLAY** (in high terrain areas & if no adverse weather).... **KEEP ON**
At 1000' to TOC **AT TOC** **OPTIMUM FL...........CHECK**	**"1000' to TOC"** **OPTIMUM FL........... CHECK** **ESTIMATES ON NAV CARD.........COMPLETE**

<table>
<tr><th>Pilot Flying</th><th>Pilot Monitoring</th></tr>
<tr><td colspan="2">
• Check appropriate w/v & temp inserted for the Flight. Level being flown. Tally Nav card with FMS for ETA, FREM/FOD.
• Delete any manual VOR selection done during departure. (When no longer required)
Fill up pilot’s report, Flight Report, RVSM Report.
• Check ENG out Alt, MEA, nearest alternate. Keep this information updated.
• Monitor Wx for : Destination en-route alternate and destination alternate, ETOPS alternate. Keep weather information up to date.
</td></tr>
<tr><td colspan="2">
Executing any LNAV modification (e.g. Direct LEGS), when cleared by ATC is done only after selecting and confirming in PLAN mode of ND

• Modify the LEGS Page
• Verify on ND, by selecting PLAN mode
• Crew are advised to select ABEAM way points to take advantage of the entered winds for accurate ETA. However, this may not be necessary on short direct to way points.
• Concur with the other pilot & execute
• Announce “LNAV”. Select “MAP” mode
</td></tr>
</table>

BEFORE DESCENT:

Pilot Flying	Pilot Monitoring
	Before the top of descent, modify the active route as needed for the arrival and approach. Verify / enter the correct RNP for the arrival.
Call **"BEFORE DESCENT PROCEDURE."** The Pilot flying to follow the actions carried out by the PM	**ATIS ....Obtained** **Recall & Notes ....Review** **Minimums .... Set** **Altimeters .... Preselect** **Autobrake .... Set** (Autobrake-mode as directed by PF.) *DRY RWY 2 or 3* *WET RWY 3 or 4* *MAX AUTO when braking action is Medium or when in PILOTS judgment where RWY is soaked with water. In all cases Monitor deceleration rate & if required use Max Manual braking.* **Note :Landing distances (QRH) / EFB should be checked for braking configuration specially for short / high altitude runways and non-normal landing configurations.**

Pilot Flying	Pilot Monitoring
	FMS ………………. Configure **Company**………………..**Notify** Notify ETA + 10 mts and STATUS of A/C and APU and any other information / requirements.
Do the approach briefing and then call for "**DESCENT CHECKLIST**."	Do the DESCENT checklist. “**DESCENT C/L COMPLETE**”

ARRIVAL PROCEDURE:

Pilot Flying	Pilot Monitoring
Passing	**20,000 feet**
Wx Rdr .... adjust	Wx Rdr ....adjust Terrain Mode .... ON (If no adverse Wx expected) Seat Belt Sign as per Company Policy. (Refer Part C) **Company (if not already done) .... Notify**
PASSING 10,000' AGL	
"10,000 ft. Descent Procedure" Select FLCH below 10,000' AGL and maximum speed 250 kts. Update changes to the arrival and approach as required. Update changes to the RNP as needed. Update the approach briefing as required. The IFS should confirm Galley / Cabin secured. This should be relayed through 6*. "CABIN READY" message on EICAS.	 **Seat belt sign .... ON** Seat Belt Sign as per Company Policy. (Refer Part C) **TURN ALL LIGHTS........ ON**

APPROACH PROCEDURE

APP PROC to be initiated at 10,000', however the approach checklist should be carried out at the TRNS LVL of the landing station.

Pilot Flying	Pilot Monitoring
The Approach Procedure is normally initiated at transition level. Complete the Approach Procedure before : • the initial approach fix, or • the start of radar vectors to the final approach course, or • the start of a visual approach	
	Set the passenger signs...... ....ON (if not already selected ON)
At transition level, set and crosscheck the altimeters. INCL STBY Update changes to the arrival and approach. Update changes to the RNP as needed.	
Update the approach briefing as needed.	
Call **"APPROACH CHECKLIST"**	Do the APPROACH checklist. **"APPROACH C/L COMPLETE"**

Flap Extension Schedule

Current Flap Position	At Speedtape "Display"	Select Flaps	Command Speed for Selected Flaps
UP	"UP"	1	"1"
1	"1"	5	"5"
5	"5"	20	"20"
20	20	25 or 30	(VREF 25 or VREF 30) + wind additives

DECELERATED APPROACH

Decelerated Approach procedures for ILS approaches ONLY:

1. *Flaps 1 at 20 miles to touchdown passing 6000' AGL; whichever is later.*

2. *Flaps 5 at 15 miles to touchdown or passing 4500' AGL; whichever is later.*

3. *Gear down and flaps 20 at 2000' AGL. However, for tailwind conditions more than 5 Kts, or, Glide Slope angle more than 3 degrees, gear down and flaps 20 at 2500' AGL.*

4. *Final landing flaps at 1500' AGL followed by landing checklist.*

The above procedures will be subject to:

i. *CAT I or better weather conditions at landing airport.*

ii. *No aircraft system failures relating to the flight control system.*

LANDING PROCEDURE:

<table>
<tr><th>Pilot Flying</th><th>Pilot Monitoring</th></tr>
<tr><td colspan="2">On RADAR vectors ....HDG SEL / desired pitch mode except VNAV (AFDS)
Full Procedure ....LNAV or desired roll mode (AFDS) / FLCH SPD or desired pitch mode except VNAV (AFDS)
(Unless performing non-ILS VNAV approach for which DGCA approval is awaited.)
<u>WARNING</u>:When using LNAV to intercept the final approach course, LNAV might parallel the localizer without capturing it. The airplane can then descend on the glide slope with the localizer not captured.</td></tr>
<tr><td>At approximately 25 nm reduce speed to ‘flaps up’ speed.
At approximately 20 nm from touchdown or crossing initial approach fix call for “Flaps 1, Flaps 1 speed”
Note: Ensure, before extending flaps, that the speed is below Vfe but at or above the flap up speed or the present flaps speed.</td><td>Set flap lever.................. 1
Set .... Flaps 1 speed **
Call “Cabin Crew Stations for Landing”</td></tr>
<tr><td colspan="2">When cleared to intercept localizer or cleared for the approach, and when on localizer intercept heading use HDG SEL / TRK SEL or HDG HOLD / TRK HOLD to intercept the final approach:
• verify that the ILS is tuned and identified
• verify that the LOC and G/S pointers are deflected towards the correct side
Note: Verify that the correct identifier is displayed. If not, check audio code</td></tr>
<tr><td>Arm.................... LOC mode
Call for “Flaps 5, SPEED 5”</td><td>Set flap lever................... 5
Set ....Flaps 5 speed**</td></tr>
</table>

Pilot Flying	Pilot Monitoring
Verify that the localizer is captured.	Call "**LOC Capture"** and check R/W heading set
When cleared for the ILS, **ARM ....APP** mod CAUTION: Arm the APP mode once the LOC is captured. This is to ensure that the airplane does not descend on the Glide Path before intercepting the localizer.	Call "**GLIDE SLOPE ALIVE**"
At 2500 feet AGL or at glide slope alive.	
"**GEAR DOWN**" **"FLAPS 20, SPEED 20**" **Speed brake lever ARMED**	**Set landing gear lever ....DOWN** **Set flap lever.................. 20** **Set .... Flaps 20 speed ****
At glide slope capture	
Call **"Flaps___, Speed VAPP"** *Lower flap settings of Flaps 25 should be used, unless limited due to landing field length or adverse weather conditions; and will be applicable only for DRY runways, and in CAT-I or better conditions.* *Note: Higher brake settings can be used to meet aircraft performance requirements.*	**Set flap lever.. landing flaps** **Set speed .... VAPP **** **Set..Missed Approach Alt ****

Pilot Flying	Pilot Monitoring
Note: VAPP is VREF + 5 kts or VREF + wind corrections with manual throttle	
Call…. "**Landing Check-list**" It is <u>mandatory</u> to ensure landing clearance obtained before calling C/L complete. Call **"C/L COMPLETE"**	**Landing Checklist ...Display** It is <u>mandatory</u> to ensure landing clearance obtained before calling landing C/L complete and deselecting the C/L. Do the Landing Check-list Call **"LANDING C/L COMPLETE"**
At the final approach fix or OM, verify the crossing altitude.	
At 1000 feet AGL	
"LANDING CLEARANCE OBTAINED"	**"1000' gear down, Flaps 30/25/20, Landing lights ON/OFF, Altimeter instruments cross-checked, landing clearance obtained / not obtained, landing checklist completed,."** Call out significant deviations. Confirms **"LANDING CLEARANCE OBTAINED"**
	At 500 feet radio altitude Verify the autoland status Call "**500 ft"**
	Call **"100 to minimums"**
If visual, announce **"VISUAL, LANDING"**	Call **"MINIMUMS"** and monitor auto call-outs, if not audible, call-out the same.

** All Mode Control Panel (MCP) changes to be performed by PF if on Autopilot and by PM, if in manual flight, as commanded by the PF.

LANDING ROLL PROCEDURE:

Pilot Flying	Pilot Monitoring
If autothrottle is engaged thrust lever begins to reduce towards idle at 25 ft. If autothrottle is not engaged, start thrust reduction after initiating flare.	
AT TOUCH DOWN : Confirm Thrust levers closed Confirm speed brake lever is up or manually move speed brake lever to UP	CONFIRM Speed brake lever is UP and call "**Speed brake UP**" If speed brake lever is NOT up call "**SPEED BRAKES NOT UP**"
CONFIRM Auto brake operation	Monitor auto-brake operation.
Note: If NO AUTO BRAKES or deceleration not satisfactory; then apply manual braking.	If EICAS CAUTION message AUTOBRAKES call **"NO AUTO BRAKES"**
WARNING: After Reverse Thrust levers are raised, a full stop landing must be made. If an engine remains in Reverse, safe flight is not possible.	
Use Idle Reverse on landing. *When using idle reverse on landing, the following factors should be considered:* *1. Runway length and landing weight*	Call **"Reversers green"**

Pilot Flying	Pilot Monitoring
2. *Tailwind on final approach* 3. *Runway surface conditions* 4. *Touchdown point* *Note: Full reversers may be used to meet aircraft performance requirements.* After touchdown with the thrust levers at idle, rapidly raise the reverse thrust levers up and aft to the interlock position initially apply full reverse thrust and then modulate as required.	
Note : Apply maximum reverse thrust in case of wet / contaminated / iced runway.	
	CALL **"60 KNOTS"**
By 60 Kts start movement of the reverse thrust levers to reach idle detent before Taxi speed.	
At taxi speed (less than 30 kts) or on vacating runway move the reverse thrust levers full down. **Note**: Use of Nose wheel steering tiller not recommended above 30 kts.	

Pilot Flying	Pilot Monitoring
Auto brakes to be disarmed before reaching taxi speed and use manual brakes as needed Call **"MANUAL BRAKES"** Before Turning Off the Runway **A/P .... DISCONNECT**	**AUTOBRAKE** Selector......**CHECK DISARM**

VT-ALA - VT-ALR

CAUTION : Do not use the Airport Map application as a primary navigation reference. The Airport Map application is designed to aid flight crew positional awareness only.

AFTER LANDING PROCEDURE:

Start the After Landing Procedure when clear of the active runway.

Pilot Flying	Pilot Monitoring
The captain positions or verifies that the SPEEDBRAKE lever is DOWN and calls for **"AFTER LANDING PROCEDURE."**	Once clear of active runway call **"AI - _____ R/W VACATED"** **APU** ....**Start** APU start can be delayed if extended taxiing is expected as a cost saving on fuel. **LIGHTS**....... **OFF/as required** (Strobe Lights OFF, Landing Lights OFF or as required / Turn Off and Taxi Lights to remain **ON**.) **WX RADAR / TERRAIN**.............. **DESELECT** On EFIS Control Panel of both Captain and First Officer side. **AUTOBRAKES ....OFF** **FLAPS**................................ **UP** **Transponder / TCAS .... As Needed** **ALA-ALR** Note: At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting (ALT ON), but not a TCAS mode.

Pilot Flying	Pilot Monitoring
	AIJ-AIR Note: At airports where ground tracking is not available, select STANDBY. At airports equipped to track airplanes on the ground, select an active transponder setting (XPNDR), but not a TCAS mode. **WX. RADAR PANEL MODE SELECTOR** .... **TEST**

VT-AIJ - VT-AIR

Engine cool down requirements :-

- Run the engines for at least 90 seconds.
- Use a thrust setting no higher than that normally used for all engine taxi operations

Engine cool down recommendations :-

- Run the engines for at least 5 minutes.
- Use a thrust setting no higher than that normally used for all engine taxi operations.

VT-ALA - VT-ALR

- Run the engine for at least 3 minutes.
- Use a thrust setting normally used for taxi operations.

SHUT DOWN PROCEDURE:

Captain	First Officer
Entering the bay ensure approach is clear and marshaller in position / bay guidance system operational. **Taxi light**.. **OFF** At the parking position **TURN OFF LIGHTS** .... **OFF**	
Parking brakes .... **Set** Inform ground **"Parking Brake applied"**	
	Electrical power .... **Set** If APU avail. confirm APU RUNNING message shown or if External power needed : Verify PRIMARY and/or SECONDARY EXTERNAL AVAIL lights illuminated. PRIMARY and / or SECONDARY EXTERNAL PWR switches .... **Push** Verify ON light/s illuminated
FUEL CONTROL switches .... CUT OFF **Note:** Ensure EGT winding down and thereafter **call for** "**Beacons Off".** If towing is needed: **Do not select the BEACON OFF.** Ground handling personnel .... Establish communications	**Note:** Ensure EGT winding down before making PA announcement (When carrying out "Shutdown Procedure") **BEACON .... OFF**

Captain	First Officer
WARNING: If the nose gear steering is not locked out, any change to hydraulic power with the tow bar connected may cause unwanted tow bar movement. Nose gear steering .... Verify locked out **CAUTION: Do not hold or turn the nose wheel tiller during pushback or towing. This can damage the nose gear or the tow bar.** **CAUTION: Do not use airplane brakes to stop the airplane during pushback or towing. This can damage the nose gear or the tow bar.** Parking brake..... Set or release Set or release as directed by ground handling personnel.	
On completion of towing or at parking position: **Parking Brakes .... Set** **“BEACON OFF”** Call for **“Shutdown Procedure”**	**BEACON** Light Switch ... **OFF**

Captain	First Officer
	Call **"CABIN DOORS MANUAL, X CHECK & CONFIRM"** **HYDRAULIC panel**........ **Set** **Note :** Depressurize right system last to prevent fluid transfer between systems. C1 and C2 AIR DEMAND pump selectors.............OFF
VT-ALA - VT-ALR **EFB CLOSE FLIGHT**.. **Select**	Left ELECTRICAL DEMAND pump selector ....OFF C1andC2 ELECTRIC PRIMARY pump switch ....OFF Right ELECTRIC DEMAND pump selector ....OFF **FUEL PUMP switches** .. **OFF** **Auxiliary Fuel Switch ... OFF** **FLIGHT DIRECTOR switches...................... OFF** VT-ALA - VT-ALR **EFB CLOSE FLIGHT**.. **Select** **Transponder / TCAS** .... **Standby** **Status messages** ......**Check** After the HYD PRESS SYS L+C+R messages shown record shown status messages in the maintenance log.

Captain	First Officer
After IFS comes to the cockpit and confirms Cabin Doors Manual: **Note** : The IFS to select flight deck door access switch to **Off**. Call **"SEAT BELT OFF"**	**SEAT BELT Selector**..... **OFF** (with consent of the Captain)
After wheel chocks are in place:	
Parking brake.......**Release** Call **"Parking brake released"**	
	Flight deck door.....**Unlock** When IFS comes to the cockpit to confirms doors manual, he will select the flight deck access switch to OFF.
CALL **"SHUTDOWN CHECKLIST"**	DO the **SHUTDOWN CHECKLIST** Call **"SHUTDOWN CHECKLIST COMPLETE"**

SECURE PROCEDURE:

Secure procedure to be done either at a station where there is a crew change or the aircraft is parked for a long period of time.

Captain	First Officer
"SECURE PROCEDURE" VT-ALA - VT-ALT **EFB POWER Switch . Push**	**ADIRU switch .... OFF** **EMERGENCY LIGHTS switch ...... (AS REQD) / OFF** **PACK switch..... (AS REQD) / .... OFF** Note: Emergency lights and pack switches off only after all passengers have disembarked. VT-ALA - VT-ALT **EFB POWER Switch......Push**
"SECURE CHECKLIST"	DO THE SECURE CHECKLIST call **"SECURE CHECKLIST COMPLETE"**

Note 1): Crew to call company on designated VHF frequency for giving CHOCKS ON TIME and fuel remaining.

Note 2): Captain and First Officer to ensure that flight deck access switch **"UNLK"** before leaving the cockpit.

Note 3): Exit the aeroplane only after all the passengers have disembarked.

NON – PRECISION (NON-ILS) APPROACH :

1. *Non-Precision Approach will be carried out in the CANPA Profile (Constant Angle Non-Precision Approaches) with VNAV or V/S mode. Detailed description of CANPA is given in Part 'C'.*

2. *CANPA procedure does not involve leveling out at MDA & Missed Approach is initiated after reaching DDA (Derived Decision Altitude). Levelling out at MDA will only be carried out in special Approaches, eg. CANARASI R/W 13 at JFK where special briefing is required.*

3. *Crew should familiarize themselves with the CANPA (Constant Angle Non-Precision Approach) procedure. A thorough briefing should be carried out and distance altitude table given in the Jeppessen to be noted for calling out by Pilot Monitoring (PM) or if not given, to be worked out and confirmed by both the Pilots. Whilst doing this, it must be ensured that the flight path remains above all step-down fixes / mandatory altitudes as given in the chart.*

4. *Pilots when being radar vectored for the approach, should extend the final approach course from the final fix / CF as appropriate. In an ILS approach, the FMS prompts you to extend the Approach Course from outer marker / CF whereas in a non-precision approach, at times, the FMS prompt defaults the extension from the VOR erasing the step-down fixes. Therefore, in this case the Pilot should return to LEGS page and down select the final fix / CF, as the case may be and insert the same on top of page 1 of LEGS. Then type in the intercept course and execute the same. This will ensure that all step-down fixes and altitudes are retained. However, crew must once again confirm from the chart that all step-down fixes have been retained.*

5. *For the Approach the PM must have FMS CDU selected to LEGS page. This page will continuously display all the way points and altitudes and the missed approach procedure. The ND of PM should be on Map mode for LNAV Approach / LOC Approach. For Raw Data VOR Approach VOR display is selected.*

6. *The Pilot Flying (PF) should have progress page 2, which will display Head Wind / cross Wind, distance off track and vertical deviation. PF ND should be on map with the proper range selected to give better*

situational awareness and orientation. The PF would also be able to observe the altitude constraints on the ND map display.

7. *Prior to commencing any approach, a thorough briefing must be carried out for such approaches covering the points mentioned herein and from the CANPA procedure.*

8. *Pilots should be subjected to as many non-precision approaches as possible at different airports during routine Simulator Refreshers, etc., simulating different weather conditions including cross Winds.*

9. *Pilots during their briefing, even for an ILS approach, should brief the actions to be taken, e.g. glide slope failure, localizer failure, Flight Director failure, etc. In case the crew have not briefed or are not prepared for the non-precision approach, they should not accept the approach and request for a HOLD to prepare for the same and thereafter accept the non-precision approach.*

VNAV APPROACH

"LNAV / VNAV or LOC / VNAV is the preferred method for accomplishing non-ILS approaches that have an appropriate vertical path defined on the FMC LEGS page. (V/S may be used as an alternate method and is given subsequently)." The A/C is equipped with RNP / ANP Alerting System. However, VNAV DA(H) will not be used. Use DDA (Derived Decision Altitude, which is arrived at by adding 50' to the MDA).

The following should be ensured :-

1) Appropriate Vertical Path Altitudes defined on the FMC Legs Page are the same as the published Vertical Path.

2) There is a published GP (Glide Path) angle on the LEGS page for the final approach segment.

3) Atleast one GPS or one DME is operational.

4) Such approaches may be flown provided RNP being used is equal to or less than RNP specified for the approach. Following RNP values must be ensured [Prog Page 4 (B777-300ER/LR) of FMS CDU and can also be cross checked on ND] :
   VOR - DME / VOR / NDB : 0.5
   RNAV / RNAV GPS : 0.3

5) If "Unable RNP" Alert is displayed during Approach. Approach will be carried out using Raw Data lateral & vertical path, i.e., with Heading select and with PM ND on VOR display etc., using V/S mode for descent. However, "LOC" only approaches can also be flown with VNAV.

6) Manual Waypoint Entry will not be entered after FAF. However, if additional waypoints are required after FAF then Fix Page may be used with Altitude constraint displayed on map for additional situational awareness.

7) On final approach VNAV will be used with speed intervention to reduce workload.

8) In case of extreme cold weather, the following safety margin will be used :-

Aerodrome Temperature	DDA
Upto -10^0 C	MDA + 50 ft
-11^0 C to - 30^0 C	MDA + 100 ft
Below - 30^0 C	No VNAV permitted

(Cold temperature altitude corrections as applicable will also be added to all minimum altitudes.)

Note : If Approach is constructed using manual entry of Waypoints due to non-availability of approach in Database then Approach will be carried out using vertical speed mode with continuous monitoring of Altitude vis-à-vis Distance from touchdown.

9) Altitude and situational awareness will be maintained at all times by using Distance Altitude crosschecks along with Raw Data lateral Path Deviation Monitoring by the Pilot Monitoring. Lateral path can be cross checked on ND by momentarily selecting POS switch to check correct Radial from the VOR.

During final Procedure turn or on Intercept heading, check the following :
1) Correct RNP value
2) In case of VOR approach check VOR & Radial tuned

777 Automatic VOR PROC Tuning & Course before passing IAF/FF to be checked

Both NDs on MAP mode for better situational awareness

L	-	LNAV armed
A	-	Altitude (Set DDA)
V*	-	VNAV Engage
S	-	Speed intervention: open SPD window & set speed.

*Before engaging VNAV set present speed as SEL SPD on VNAV DES page.

Check FMA: "SPD LNAV VNAV PTH" (indicating on "Approach Logic" Ref FCOM Pg 11.31.25-26)
Pilot Flying to select Prog Pg on FMS CDU to display Wind.
Pilot Monitoring to select Legs Pg on FMS CDU for awareness of legs sequencing & missed approach.

3 NMs to FAF	:	Gear Down, Flaps 20, Speed brake arm. Check Radial by momentarily pushing POS switch.
2 NMs to FAF	:	Landing Flaps
1 NMs to FAF	:	Landing Checklist completed
At FAF	:	Check A/C commences descent. (Be aware of possible short level segment "fly off". Refer FCTM,

Chapter 5 "Vertical Path Construction")

If VNAV ALT engages it could be due to the following :-

a) A/c is below the path and yet to capture path.
b) Passing a Way point on the approach and the Crew has failed to reset the MCP altitude to a lower altitude. Eg., Lower Altitude (i.e. DDA) not set prior to FAF. In such case, use V/S mode with continuous RAW data vertical path monitoring as given in CNAPA V/S Approach.
   - Upon commencing descent and when 300 ft below Missed Approach Altitude set Missed Approach Altitude.
   - At DDA if visual, disconnect Auto Pilot and continue with Visual Approach to land.
   - If not visual, carry out Missed Approach.

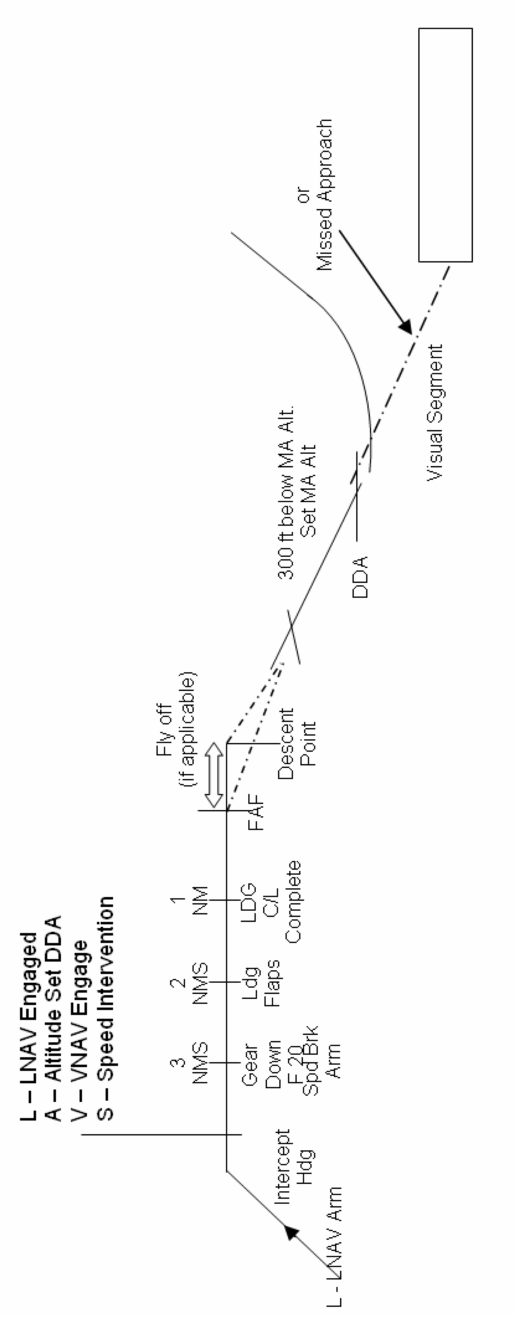
Note 1 :- Raw data Vertical Path Distance / Altitude checks must be called out by PM as per the procedure given in CNAPA V/S Approach.

Note 2 :- In case unable RNP Alert message appear then disengage LNAV and use Hdg Select and V/S with Radial & Vertical Path monitoring. In case of Radial or Vertical Path Deviation carry out a Missed Approach as per the procedure.

Note 3 : Localizer only Approaches can also be carried out by engaging LOC and VNAV instead of LNAV and VNAV, using the appropriate DDA.

Note 4 : For detailed description on LNAV / VNAV approach, refer to FCTM.

Note 5 : DDA is initially set as a target Altitude for the Auto Flight System to commence descent. 300 ft is a capture altitude for the AFS for the selected Rate of Descent. The DDA is switched to Missed Approach Altitude ensuring A/C is 300 feet below Missed Approach Altitude to avoid Auto Flight System capturing this Altitude & leveling out prematurely.


L – LNAV Engaged
A – Altitude Set DDA
V – VNAV Engage
S – Speed Intervention
L - LNAV Arm
Intercept Hdg
3 NMS
Gear Down F 20 Spd Brk Arm
2 NMS
Ldg Flaps
1 NM
LDG C/L Complete
FAF
Fly off (if applicable)
Descent Point
300 ft below MA Alt. Set MA Alt
DDA
Visual Segment
or Missed Approach

CANPA V/S APPROACH

1 Approach preparation:

a) DME Altitude table ready (ref description given in CANPA section 'C'), charts studied and briefing completed.

b) Set MDA at DDA.

c) Tune and identify the NAV AID for which the Approach is published

2 Execution:

LNAV and MAP mode (PF) would be the preferred method. The Navaid will be tuned, and radial selected with VOR mode on PM ND. During Radar Vectoring select straight in intercept course to FAF for proper waypoint sequencing and when clear to intercept select LNAV and monitor interception on LNAV and VOR radial on PM ND.

(**Note** : Auto pilot should be used until suitable visual reference is established).

a) When at Initial Approach Altitude, set DDA.

b) Initial approach with flaps 10

c) 3 Nm before commencing descent for final approach "gear down flaps 20"

d) 2 Nm before commencing descent for final approach "flaps 30", complete landing check list.

e) 1 Nm Landing Check list completed & push V/S switch.

f) At descent point commence descent using V/S mode to descend to DDA adjusting V/S to ensure flight path coincides with the DME Altitude table. PNF to call out DME Altitudes and Standard Callouts. select V/S 800 ft/min ROD. On approach make small changes to V/S to remain on the correct descent profile. PNF will call out the altitudes vis-à-vis DME distance as per the table prepared and reviewed (Example 5 NM 1500 correct or 4 NM 1300’ 100 ft. high).

g) Maintain LNAV and resist the temptation of looking out prematurely to sight the runway for alignment as you may align with a road or some other bright lights.

h) Use Auto Pilot till Approach lights/Runway lights/PAPI-VASI in sight.

Note: In case of “Unable RNP” Alert, switch to Raw data (i.e. maintain Radial by switching to VOR mode)

Set ‘Missed approac altitude latest by 300 feet above DDA.

i) At DDA R/W in sight PF to disengage autopilot and autothrottle, align with R/W and land. For commonality with LNAV/VNAV procedure and to reduce work load, there is no requirement to switch off FDs when transiting to Visual segment. However, if the PF desires his FD to be switched off, he must brief the PM during briefing.

j) If not visual at DDA, “go around”. At DDA if R/W is not in sight execute a go around by pressing TOGA switch. Above 400’ engage LNAV / Heading select and monitor aircraft following the correct Missed Approach flight path from MAP onwards. At 1000 select flight level change and speed for the missed approach procedure.

k) On reaching MAP carry out Missed Approach procedure.

Note 1: This procedure conforms to the non-precision approach requirements as follows :-

i) Aircraft remains at or above all step down fixes as charted.

ii) The requirement for aircraft to not descend below MDA.

iii) To carry out the missed Approach Procedure only at MAP where the aircraft should be at or above MDA.

iv) MDA bug is set to DDA so that at no stage in the procedure the aircraft goes below MDA.

Note 2: A 3^0 descent path gives a descent rate of 300 ft. per NM. Approximately V/S of 700 – 800 is required. The above procedures are valid for higher descent gradients for up to 400 ft/NM – approx. ROD 900 – 1000 required.

Note 3: DDA is initially set as a target Altitude for the Auto Flight System to commence descent. 300 ft is a capture altitude for the AFS for the selected Rate of Descent. The DDA is switched to Missed Approach Altitude ensuring A/C is 300 feet below Missed Approach Altitude to avoid Auto Flight System capturing this Altitude & leveling out prematurely.

SIDE STEP APPROACH

At times the Air Traffic Control may request the aircraft to carry out a side step approach i.e. Instrument Approach for one runway and thereafter a side step Visual maneuver on a parallel runway. In such cases, it must be ensured that the side step maneuver should be commenced above circling minima or Side Step minima if Charted or 1000 ft AGL, whichever is higher and the approach stabilized by 500 ft above airport elevation. All crew should be familiar with the stabilized approach write up in Operations Manual Part A, Page 25-1.

It is reiterated that many VOR/ non-precision approaches are not aligned with the runway and visual maneuvering is required. The wings should be level on final approach without any drift when the aircraft reaches 300 ft above airport elevation. A Missed Approach must be carried out in case wings level without drift at 300 ft is not achieved. The missed approach procedure will be carried out for the runway for which the Instrument Approach was carried out unless specified otherwise by ATC. All such non-precision approaches as described above should be carried out only by the PIC.The exceptions to this is in case of Command Training or whilst carrying out Route Check of a Commander. In such cases if the approach is not stabilized as described above, the PIC must take over controls and execute a Missed Approach. proper CRM must be maintained at all times.

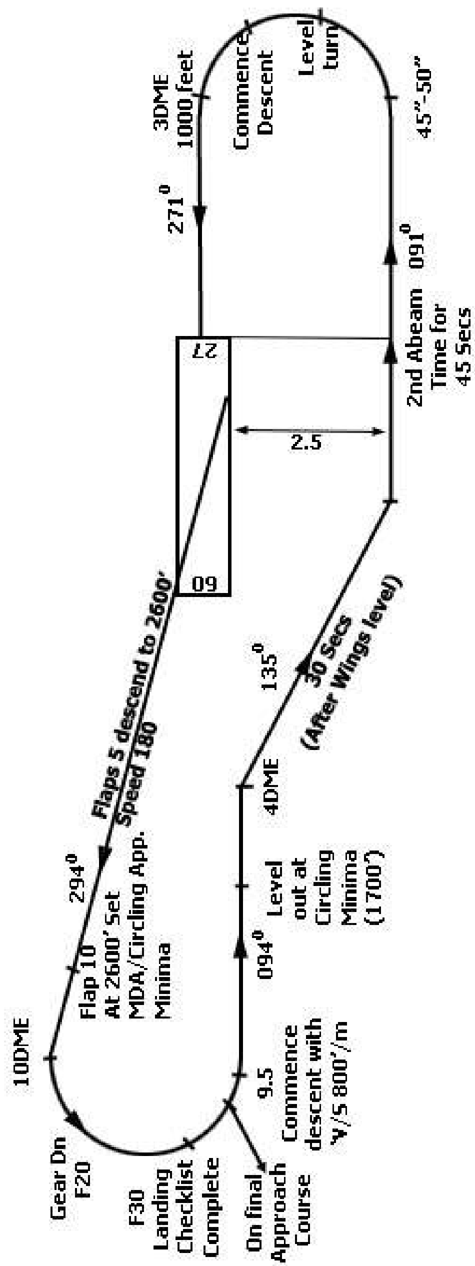
CIRCLING APPROACH

Circling Approach

Although Circling Approaches are not normally carried out in our operations, circling Approach will be practiced during training to give pilots confidence in carrying out such approaches in case of contingency, where no instrument approach is available for the runway in use. In such cases, Pilots may be compelled to carry out an instrument approach on one runway and maneuver to land on the runway in use. Circling approach is essentially a visual circuit carried out at the circling minima. The circling maneuver is carried out from a precision or non-precision approach leveling out at the circling minima on autopilot with gear down, landing flaps & landing checklist completed. With the landing runway in sight aircraft is maneuvered to join the downwind of the runway in use in the shortest way at the appropriate displacement from runway (usually 2 1/2 miles). The downwind is extended from abeam the landing threshold (Second Abeam) for the duration as given below:

Circling Minima 1000' - Time out 30"
Circling Minima 1500' - Time out 40"
Circling Minima 2000' - Time out 50"

Turn to finals is initiated on auto pilot / auto throttle with a Descent Rate of 700 ft/min. Autopilot is disconnected only when on slot and landing is assured atleast by 500' AGL. It must be remembered that in case of a missed approach, the missed approach procedure to be followed will be the published missed approach of the Instrument approach carried out initially. Example: Initial approach Mumbai VOR DME E/W 09 and circling carried out at Circling Minima 1700 ft for CAT D, and landing on R/W 27. Missed approach will be carried out following Missed Approach Procedure for R/W 09, unless specified otherwise by ATC. A typical circling pattern is given in figure.



3DME
1000 feet
Commence
Descent
Level
turn
45"-50"
271°
091°
27
09
2.5
2nd Abeam
Time for
45 Secs
Flaps 5 descend to 2600'
Speed 180
135°
30 Secs
(After Wings level)
4DME
294°
Flap 10
At 2600' Set
MDA/Circling App.
Minima
Level
out at
Circling
Minima
(1700')
094°
10DME
9.5
Commence
descent with
V/S 800'/m
Gear Dn
F20
F30
Landing
Checklist
Complete
On final
Approach
Course

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LOC Back Course Approach

1. During LOC Back Course approach RAW Data must be monitored.

2. Selection and execution of LOC back course approach auto tunes the ILS and displays the front course.

3. LOC Back course approaches cannot be flown in the MCP LOC or APP mode.

4. PFD displays the selected ILS identifier/ frequency and the approach front course and ILS DME distance.

5. LOC Back course approaches are in the data base for airports where applicable. Example: IQALUIT LOC BC R/w 17.

6. Autopilot use is recommended until suitable visual reference is established.

7. If required to remain at or above MDA (H) during the missed approach, missed approach must be initiated at least 50 ft above MDA (H).

8. On 200 LR/300ER A/C, BCRS (back course) to be selected on the integrated Standby Flight Display (ISFD)

The recommended roll mode for LOC back course Approach is LNAV.

When on the final approach course intercept heading :

- Verify localizer is tuned and identified.
- Verify that the LOC pointer is shown.

Use the autopilot during the approache to give :

- Autopilot alerts and mode fail indications.
- More accurate course and glide path tracking
- Lower RNP limits.

This procedure is not authorized using QEF.

Approaching IAF	Flaps 1 / Speed 1
At or approaching Intercept Heading	Flaps 5 / Speed 5 For LOC-BC approach :- • Verify that localizer is tuned and identified. • Verify that the LOC pointer is shown. LNAV – Armed / engaged or HDG SEL / TRK SEL "Cabin Crew Stations for landing"
3nm before FAF	Gear down, Flaps 20 / Speed 20 Arm Speed brakes Set DDA or intermediate ALT constraint on MCP *
2nm before FAF	Select Landing Flaps / Speed Vapp Landing Checklist complete
1nm before FAF	V/S / FPA Switch ....Push
Overhead FAF	Select V/S 700 to 800 fpm or FPA - 3^0 initially Check time, if reqd. Alt & Inst. X-chk. Align heading and adjust V/S or FPA as reqd.
	Ensure compliance with each minimum altitude constraint (step down fixes).
1000' AGL	PM calls "1000'"
300' above MDA (H)	Select Missed Approach Altitude
On reaching DDA and visual	Disconnect Auto Pilot, PF FD off, PM FD off then on, align with R/W confirm ldg clx obtained and land.
Or on reaching DDA	If R/W not sighted, initiate Missed Approach Procedure.

* When current constraint is assumed, the next constraint may be set prior to ALT engagement to achieve continuous descent path.

Note : Do not continue the approach below DDA unless the airplane is in a position from which a normal approach to the runway of intended landing can be mae and suitable visual reference can be maintained.

Upon arrival at DDA or anytime thereafter, if the above requirements are not met, immediately execute a missed approach.

GO-AROUND / REJECTED LANDING / MISSED APPROACH PROCEDURE

A Missed Approach is initiated at any time when no visual cues are available or lost at or after DA (H) or in the opinion of the Captain the approach is not stabilized. If the Missed Approach is initiated following an autopilot approach leave the autopilot engaged. If the approach is made manually then it is advisable to engage autopilots once the Missed Approach is initiated and a positive climb established before engaging autopilot. (Minimum altitude 200 ft).

TO/GA – Armed with Flaps out of up/Glide-slope captured.
Thrust limit – GA:-

- Flaps extended out of up or
- Flaps in landing position or
- Glide slope captured

Note:

1. Thrust Limit is locked in GA with flaps in landing position or glide slope captured.

2. Even with F/D switches off the flight director bars are displayed on pushing either TO/GA switch till another roll mode is selected on the MCP.

VT-ALA to ALR:-

1. IF an LNAV path is available LNAV automatically arms and engages >50ft RA in manual flight and >200 ft RA with autopilot engaged.

2. During a go-around from a LAND 2/3 approach automatic LNAV engagement (selection of another roll or pitch mode) causes disconnection of autopilot rudder control. Hence performing a engine out missed approach with TAC inoperative manual rudder control may be required.

Above 400 ft select Roll Mode as appropriate for the 200 and 200ER.

If initial maneuvering is required during missed approach do the missed approach procedure through to gear up before initiating the turn. Delay further flap retraction until initial maneuvering is complete and safe altitude and appropriate speeds are attained. When the flaps are retracted to desired position and the speed is approaching the maneuvering speed select FLCH or VNAV and ensure CLIMB thrust is set.

Note: If VNAV is used ensure that the FMC missed approach profile should contain the appropriate holding speeds and altitudes.

Engine failure during a go-around should be treated as though it occurred during a flat 20 takeoff. All procedures are the same as engine failure on takeoff.

Note: VREF30 + wind correction at flaps 20 may result in an airspeed that provides less than full maneuver margin (top of amber band).

TOGA pitch mode initially commands a go-around attitude and then transitions to speed as the rate of climb increases. This speed is between command speed and command speed plus 25 kts. The TOGA roll mode maintains existing ground track. missed approach

With the first push of either TO/GA switch :

- the PFDs display roll and pitch guidance to fly the go-around
- the autothrottle engages in thrust (THR) mode for a 2,000 FPM climb
- the AFDS increases pitch to hold the selected speed as thrust increases
- if current airspeed remains above the target speed for 5 seconds, the target airspeed is reset to current airspeed, (to a maximum of the IAS/MACH window speed plus 25 knots).

With the second push of either TO/GA switch :

- the autothrottle engages in the thrust reference (THR REF) mode for full go-around thrust.

Note : Selection of pitch and roll modes below 400 ft AGL does not change the autopilot and flight director modes.

During Missed Approach maneuver turns to be initiated only after gear up. Delay further flap retraction until initial maneuvering is complete and a safe altitude and speed are attained.

Rejected Landing is a go around below 50 ft AGL. Since ground proximity is an issue, do not retract landing gear up till positive climb and minimum 50 ft RA to cater for the possibility of touchdown after initiating the go around.

Note : Command speed should not be increased until a safe altitude or the flap retraction altitude is attained.

During the Missed Approach, if in VNAV, a premature level off could occur (VNAV ALT on FMA) the crew then would require to select FLCH to complete the climb to Missed Approach altitude.

Pilot Flying	Pilot Monitoring
Call **"GO AROUND FLAPS 20"** At the same time: • PUSH TOGA SWITCHES (Flaps 5 or 20 for one Engine) Verify G/A attitude Verify or adjust thrust **Note** : For manual go-around select or verify go-around Thrust and follow F/D Pitch bars to commanded attitude (15^0)	Select Flaps 20 or (Flaps 5 or 20 for one engine) Verify G/A attitude Verify or adjust thrust
Verify +ve Rate of Climb **"GEAR UP"** Limit bank angle to 15 degrees if airspeed is below	"**+ve Rate of Climb**" Set the landing gear lever to UP and confirm the F/D's are ON.

minimum maneuver speed.	
Pilot Flying	**Pilot Monitoring**
Select ....autopilot **......ON** (Min Alt 200 feet AGL) **SELECT OR VERIFY Roll Mode** (LNAV OR HDG SEL) Verify the Missed Approach Altitude. Verify Missed Approach Route is tracked.	At 200' AGL, **"200 Feet"** At 400' AGL,**"400 Feet"** Verify the Missed Approach Altitude. Verify Missed Approach Route is tracked.
Set speed to Flaps UP or desired flap setting speed **Note :** In case of manual go-around call out the desired speed and flap setting for PM to set Call for **flap retraction** on schedule and at or above the desired flap maneuvering speed select "**FLCH**" Verify CLIMB THRUST or CONT THRUST (one engine) Follow the Go-around route and ALT CAPTURE. Call "**AFTER TAKE OFF C/L**"	At 1000' AGL, "**1000 feet**" Verify or set speed in case of manual go-around with PF's consent. Retract flaps on schedule and select "**FLCH**" with PF's consent in case of manual go-around. Verifies CLIMB THRUST or CONT THRUST (one engine) is set Confirm the Go-around Route is followed and Go-around ALT is captured DO AFTER TAKE OFF C/L. Call "**AFTER T/O C/L COMPLETE**"

DIVERSION TO ALTERNATE

For determining holding time prior to diversion, the hold has to be inserted & executed. Consider stacking at alternate. The diversion should be initiated well before INSUFFICIENT FUEL message is expected. If you decide to divert, stick to plan. Do not change your decision.

Check / update - alternate weather / icing / A/C gross Wt. / fuel reserves/ NOTAMS / co. Advisory/ stay oriented. Keep PAX, company and Handling Agents informed.

Select ALTERNATE AIRPORT page 1 / 2. The page displays 4 airport in an ETA sequence. A manual selection of an alternate airport can be made by pushing the line select key left of the airport identifier.

Three route option to the desired alternate airport can be selected :

- DIRECT TO – direct to alternate
- OFFSET – flight plan route with an offset
- OVERHEAD – flight plan route to a waypoint, then direct to alternate

The alternate airport displays calculated airport ETA and arrival fuel based on the selected route altitude and speed.

Discuss jeppesen charts.
Insert Arr - STAR - TRANS.
Insert SPD & ALT constraints.
Keep current on endurance & Wx.

CROSS WIND LANDING

Crosswind landing techniques :

Refer FCTM Chapter 6.

CROSS WIND LANDING

Limitations for Cross-wind component is as follows :

Runway condition	
Take-off and landing :	
DRY runway	25 kts
WET runway	20 kts
1. Slush/wet snow/ice covered runway 2. Landing in CAT I or lower minima	15 kts
SLIPPERY runway * (see note below)	10 kts

Note : Braking coefficient 0 to 0.29 = POOR
Braking coefficient 0.30 to 0.39 = MEDIUM
Braking coefficient 0.40 and above = GOOD

Landing with Braking action poor is not permitted except in emergency

TAIL WIND – Any runway condition – 10 kts

Automatic landing : # Maximum allowable wind speeds when landing weather minima are predicated on autoland operations:

Head wind	25 Knots
Tailwind	10 Knots
Cross wind	25 knots

WIND SPEED (Kts)			
ANGLE	**15**	**25**	**40**
10	86	>100	>100
20	43	73	>100
30	30	50	80
40	23	38	62
50	19	32	52
60	17	28	46
70	16	26	42
80	15	25	40
90	15	25	40

ACCEPTANCE CERTIFICATE:

Signing the acceptance certificate means that :-

a) The aircraft has a current Certificate of Airworthiness and a valid Flight Release.

b) The instruments and equipment as prescribed by the manufacturer / DGCA are installed and are sufficient for the flight / type of operation to be undertaken.

c) All emergency equipment required for the intended flight are serviceable and are on board

d) The mass of the aeroplane and center of gravity location are such that flight can be conducted safely, taking into account the flight condition expected

e) Any load carried is properly distributed and safely secured.

f) It carries sufficient fuel and oil for the intended flight in accordance with this part of the CAR.

g) The engines are developing the rated power

h) The various documents required for the flight are valid and are on board

i) There is no physical damage apparent during the walk around inspection

j) Sufficient length of runway is available for safe takeoff and line of flight in the takeoff direction is not obstructed.

k) The flight controls of the aircraft are working freely and in correct sense.

l) View of the Pilot is not interfered with / by any part of the aircraft structure.

m) A check has been completed to ensure that the aircraft can be operated within approved operating limitations contained in the Certificate of Airworthiness / Flight Manual or other appropriate and relevant documents

n) That the CFPL (Computerized Flight Plan) has been completed for the intended flight.

Note : As regard to item (g), the Pilot shall ensure before takeoff that engines are developing correct power.

A/C CODES:

Code element 1			Code element 2	
Code Number	**Aeroplane reference field length**	**Code Letter**	**Wing span**	**Outer main gear wheel span #**
(1)	(2)	(3)	(4)	(5)
1	Less than **800m**	A	Up to but not including **15m**	Up to but not including **4.5m**
2	**800m** up to but not including **1200m**	B	**15m** up to but not including **24m**	**4.5m** up to but not including **6m**
3	**1200m** up to but not including **1800m**	C	**24m** up to but not including **36m**	**6m** up to but not including **9m**
4	**1800m** and over	D	**36m** up to but not including **52m**	**9m** up to but not including **14m**
		E	**52m** up to but not including **65m**	**9m** up to but not including **14m**
		F	**65m** up to but not including **80m**	**14m** up to but not including **16m**
# Distance between the outside edges of the main gear wheels.				

ALL OUR 777s FALL UNDER CODE E. Check airport limitations for code E A/C.

ADIRU:

Note: Initial power-up requires battery bus power and the ADIRU switch to be ON. **The switch must be selected OFF, then ON for every flight**. When the ADIRU is switched off, it must complete a full realignment cycle before the airplane can be moved. (Switch to remain off for a minimum 30 seconds before being selected on. Full alignment takes 6 to 15 minutes depending on the latitude.)

Note : With the ADIRU in NAV mode a change to an automatic realign mode takes place once the aircraft stops for an extended period of time. This zeros the error and realigns the platform. This, however, does not do a complete test of the ADIRU.

BRAKES:

AUTOBRAKES

To obtain the optimum benefit from reverse thrust it is important to initiate reverse thrust immediately after touch down.
AUTO brakes are the preferred mode over manual application, it will provide a specified rate of deceleration during the period when reversers are being deployed by the pilot, and there after serve to maintain that specified deceleration rate. The AUTO brakes do not decrease the distance required to stop the aeroplane. When the LDA is marginal or if the RWY is wet or slippery select AUTO brakes ‘3’ or ‘4’. Autobrakes ‘2’ or greater results in a continuous brake application, which increases brake life.

STOPPING DISTANCE

Factors that affect Stopping Distance include: height & speed over threshold, glideslope angle, flare, lowering nose on the RWY, reverse thrust, speedbrakes, wheel brakes & runway surface conditions. The A/P (during autoland) & AUTO BRAKES should remain engaged until a safe stop is assured and adequate visibility exists to control the airplane using visual references. Call out “MANUAL BRAKES”; disconnect autobrakes by smoothly applying brake pedal force. Disarm autobrakes before un-reversing. Other ways see below.

If no AUTO call outs, then PM must announce 500’, approaching minimums, minimums on Pr Alt & 100, 50, 30, 20, 10 on RA.

If call for 500’ is missing, and you get ‘AUTO CALLOUT’ caution msg then the rest of the calls will not come either.

Transition to Manual Braking

- The speed, at which the transition from autobrakes to manual braking is made, depends on airplane deceleration rate, runway conditions and stepping requirements.

- Normally the speedbrakes remain deployed until taxi speed, but may be stowed earlier if stopping distance within the remaining runway is assured. When transitioning to manual braking, use reverse thrust as required until taxi speed. The use of speed brakes and reverse thrust is especially important when nearing the end of the runway where rubber deposits affect stopping ability.

- Smoothly apply brake pedal force as in a normal stop, until the autobrake system disarms. Following disarming of the autobrakes, smoothly release brake pedal pressure. Disarming the autobrakes before coming out of reverse thrust provides a smooth transition to manual braking.

- Manually position the autobrake selector off (normally done by the PM at the direction of the PF).

BRIEFING:

Note down the reporting time on CFPL (Computerized Flight Plan) (enter on the Pilots Report later). The Flight Despatcher briefs the crew as under:

- Technical condition of the aircraft & APU :
  The crew will verify the technical state of the aircraft, with regard to airworthiness, acceptability of malfunctions (MEL) & influence on the Flight Plan.
- Boarding Gate No, Parking Bay No. and Coordinates.
- Weather Briefing: Wx charts & TAFORS are presented for Airports in the sequence Dep / Dep Alt / Enroute Alt / Dest / Dest Alt, and should include,
  - Actual and expected weather conditions for Take-off including runway conditions.
  - Enroute significant weather/winds and temperatures.
  - Terminal forecasts for destination and alternates/airports.
  - **Actual weather** for destination and alternates for short range flights. The meteorological conditions at airports along planned route.
  - Weather can affect the choice of routing (e.g. minimum time) and choice of flight level.
  - Serviceability of app. aids can affect the Wx. Minima acceptable for the dispatch of a flight.
  - The possibility of wet/ contaminated runway at the departure and destination airfield must be checked.
  - Enroute icing conditions must also be checked.
  - Check for possibility of holding due to weather at the destination /Alternate.
  - The wind component on the Flight Plan is in relation to the Average Track between Departure & Destination. ISA Temp. Dev is the difference between Std. Temp. at the

planned flight level & forecast Avg. Temp in the Nav. Card.

- **Notams**:

  Notams and chart notams must be examined for, Airway Closure, nav aid unserviceability, runway and approach aid availability etc, all of which may have an impact on the final fuel requirement & the routing & also can affect the Wx Minima acceptable for dispatch of the flight. Follow the station sequence as in weather briefing.

BEFORE TAKEOFF

A rolling takeoff procedure is recommended for setting takeoff thrust. It expedites takeoff and reduces risk of foreign object damage or engine surge / stall due to a tailwind or crosswind. Rolling takeoffs are accomplished in two ways :

- While maintaining normal taxi speed align the aircraft with the runway centerline. Ensure the nose wheel steering tiller is released and advanced thrust levers to approx 1.05 EPR (PW) or 55% N1(GE). Allow the engines to stabilize, but not more than 2 seconds, and push the TOGA switches. (if manual, then advanced thrust levers to takeoff thrust)
- If holding on runway release nose wheel steering tiller, release brakes and thereafter apply takeoff thrust.

A standing takeoff is accomplished by holding the brakes until the engines are stabilized after which nose wheel steering tiller is released, thereafter brakes are released and then push the TOGA switches. (if manual, then advanced thrust levers to takeoff thrust).

Note : During takeoff if an engine exceedance occurs and the decision is made to continue the takeoff, do not retard the thrust levers in an attempt to control the exceedance. The appropriate NNC to be accomplished at a safe altitude and air speed (minimum 400 ft AGL).

Nose wheel steering tiller is not recommended above 30 knots. Pilots to exercise caution when using the nose wheel steering tiller above 20 knots as it may lead to over controlling resulting in possible loss of direction control. The Pilot flying should keep a light forward pressure on the control column till 80 kts. At 80 knots, relax the forward control column pressure to the neutral position. Direction control of the airplane is by use of rudder pedal steering and rudder.

Note : Rudder becomes effective between 40 – 60 kts.

The captain should keep one hand on the thrust levers until V1 in order to respond quickly to a rejected takeoff condition. PM to announce 80 knots and the pilot flying should verify that his airspeed indicator is in agreement.

If the accuracy of either of the primary airspeed indicator is suspect, refer to standby airspeed indicator. Another source of speed information is the ground speed indication.

During takeoff, in gusty or strong crosswind conditions it is recommended to use higher thrust settings than the minimum required. This use of higher thrust reduces runway occupancy time thereby minimizing the exposure to gusty conditions during rotation liftoff and initial climb. If gust is experienced near VR, as indicated by stagnant airspeed or rapid airspeed acceleration, momentarily delay rotation. Use caution while keeping wings level as excessive control wheel inputs may cause spoilers to rise which has the effect of reducing tail clearance.

The HOLD mode remains engaged until VNAV engagement or another thrust mode is selected. The HOLD mode protects against thrust lever movement if a system fault occurs. Lack of the HOLD annunciation means the protective feature may not be active.

Note : No crew action required unless a subsequent system fault causes unwanted thrust lever movement.

On ground the first push below 50 kts on the TOGA switches, engages the auto throttle in THR REF mode. The auto throttle does not engage between 50 kts and 400 ft RA. A second push above 80 Kts disarms LNAV and VNAV. After the airplane is in the air, pushing a TO/GA switch advances the thrust to maximum available thrust and THR REF is annunciated.

Takeoff speeds are based on minimum control speed, stall speed, and tail clearance margins. A smooth continuous rotation is initiated at VR, which ensures adequate tail clearance margin. Initiate a smooth continuous rotation at VR toward 14^0 of pitch

attitude (with one engine inoperative pitch attitude 12^0 - 13^0). After liftoff use the flight director as the primary pitch reference cross checking indicated airspeed and other flight instruments.

Liftoff attitude is achieved in approximately 4 seconds. Rotation rates vary from 2 to 2.5 degrees per second ($1/2^0$ per sec less for eng inop).

Model	Flap	Liftoff Attitude (degrees)	Minimum Tail Clearance inches (cm)	Tail Strike Pitch Attitude (degrees)
777-200	5, 15, 20	8.5	37 (94)	12.1
777-200 LR	5, 15, 20	8.5	37 (94)	12.1
777-300	5, 15, 20	7.0	36 (91)	8.9
777-300 ER	5, 15, 20	8.5	30 (76)	10.00

Note : 777-300 ER values valid when the Semi-Levered Gear (SLG) is operative. When the SLG is inoperative, use 777-300 values.

The speed commanded, at liftoff, by the flight director is V2 + 15 or a higher speed held for more than 5 sec to a maximum of V2 + 25.

Note : If an engine failure occurs on ground, the pitch command target speed at liftoff is V2 or airspeed at liftoff, whichever is greater. However, after liftoff

- V2, if airspeed is below V2
- Existing speed, if airspeed is between V2 and V2 + 15
- V2 + 15, if airspeed is above V2 + 15.

REDUCED THRUST TAKEOFF

Regulations permit the use of up to 25% takeoff thrust reduction for operation with assumed temperature reduced thrust. Use of reduced thrust is not allowed

- On Runways contaminated with water, ice, slush or snow.
- If potential windshear conditions exist
- With DDG dispatch which affect take-off RTOW.

The assumed temperature reduced takeoff EPR/N1 is read from the Max. Takeoff EPR/N1 table at the assumed temperature. The minimum allowable EPR/N1 for reduced thrust, based on 25% takeoff thrust reduction, is read by entering the table with maximum allowable EPR/N1 for the actual OAT. It is not recommended to set Takeoff EPR/N1 lower than the scheduled climb EPR/N1.

After liftoff, during initial climb the flight director commands pitch to maintain airspeed of V2 + 15 to 25 kts until another pitch mode is engaged. V2 + 15 is the optimum climb speed with takeoff flaps (both engines operating). If the airspeed exceeds V2 + 15, stop the acceleration but do not attempt to reduce airspeed to V2 + 15.

At times, due to obstacle clearance noise abatement or departure procedures an immediate turn after takeoff may be required. The turn should be at a safe altitude (atleast 400 ft AGL). Maintain takeoff flaps with speed V2 + 15 to 25 (max bank angle of 30^0 is permitted). Acceleration and flap retraction should be done only after completing the turn and at or above flap retraction altitude.

Note : Possibility of engine failure during departure must always be kept in mind.

CLIMB PROCEDURE

Reduced Thrust Climb

When using assumed temperature to calculate the required take off thrust the FMC automatically selects reduced climb thrust.

- Climb 1 is a constant 10% derate of climb thrust
- Climb 2 is a constant 20% derate of climb thrust

These climb thrust reductions increase linearly as the airplane climbs above 10,000 ft until full climb thrust is restored by 12,000 ft. However, if the rate of climb drops below 500 ft per minute the next higher climb rating should be manually selected by the crew.

The crew normally should allow the FMC to automatically select the climb derate, unless and until a higher climb thrust is required for adverse weather, ATC, etc.

Complete the After Takeoff Checklist before starting the Climb and Cruise Procedure.

ENROUTE CLIMB SPEED

ECON climb speed is automatically computed by the FMC and displayed on the climb and progress page. This ECON climb speed schedule of the FMC minimizes Trip cost, varies with gross wt and cost index.

Company policy on climb speed is limited to 250 kts below 10,000’ AGL (rounded off for nearest 1,000 ft) or as required by SID or ATC. Note: The term “No ATC speed restriction” for Departures means, the crew may accelerate to Flaps up speed, in case Flaps up speed is above 250 Kts. In case, the Flaps up speed is greater than 250 Kts, ATC clearance is required to accelerate to Flaps up speed.

Climbing above 10,000’, the FMC automatically defaults ECON speed.

If the FMC is unavailable,

- 250 kts / VREF 30 +80 kts, which ever is higher below 10,000’
- 310 kts / .84 Mach – above 10,000’

MAX RATE CLIMB

This provides high climb rates and minimum time to CRUISE ALTITUDE. This is approx. Flaps UP Maneuver speed + 60 kts until intercepting M.82.

MAX ANGLE CLIMB

The FMC provides Max angle climb speeds on VNAV 1/3. This speed is normally used for obstacle clearance, minimum crossing Altitude or to reach a specified altitude in a minimum distance. This speed varies with gross weight and provides approx. the same climb gradient as flaps up Maneuvering speed (Vref30 + 80 Kts).

CLIMB NOTE:
Note : -

1) Select LNAV if not already armed before takeoff, after passing 400 ft AGL.
2) LNAV, if armed, engages above 50 ft AGL and within 2.5 nm of active legs. If there is no departure procedure or the route does not begin at end of runway, use heading select at 400 ft AGL to intercept desired track for LNAV capture.
3) Runway heading to be set on MCP even if an immediate turn after takeoff is required.
4) VNAV is the preferred method of managing the AFDS for takeoff. VNAV when armed for takeoff engages at 400 ft AGL.
5) if VNAV not engaged, pushing the CLB CON Switch will engage climb thrust. (VANV not avail in case of dual FMC failure).

STEP CLIMB

As a current company policy, climb to next higher level must be initiated as per the flight plan while catering for any difference in Gross Weight between Actual and Flight Plan.

CRUISE

The Cruise Mach number will be as per Company policy.

Maximum Altitude

Maximum altitude is the highest altitude at which the airplane can be operated. It is determined by three basic characteristics, which are unique to each airplane model. Maximum sustainable altitude is based on :-

- Current gross weight
- Temperature
- Number of engine operating
- Cruise reference thrust limit
- Default set by airline (CRZ or CLB)
- Speed (ECON, ECOM, LRC, SEL, EO OR CLOSE) option
- Residual speed of climb default set by the airline (range 100 to 999 fpm)

The crew needs to be aware that the minimum maneuver speed indication on the airspeed display does not guarantee the ability to maintain level flight at that speed. Decelerating the airplane to the amber band may create a situation where it is impossible to maintain speed and/or altitude because as speed decreases airplane drag may exceed available thrust, especially while turning.

The altitude limits as calculated by the FMC and displayed on VNAV 2/3, depends on

- Airplane weight
- Cruise CG
- Temperature deviation at the cruise altitude

FMC fuel predictions are not available above the FMC maximum altitude and are not displayed on the CDU. VNAV is not available above FMC maximum altitude. Fuel burn at or above maximum altitude increases. Flight above this altitude is not permitted.

The FMC, for LNAV operation only, provides a real-time bank angle limiting function which will protect the commanded bank angle from exceeding the current available thrust limit.

If the crew for any reason has to operate in any other mode other than LNAV, fly at least 10 knots above the lower amber band and use bank angles of 10^0 or less when operating at or near maximum altitude. (BANK LIMIT SELECTOR……AUTO varies between 15^0 – 25^0, depending on TAS) If speed drops below the lower amber band, immediately increase speed by doing one or more of the following :

- Reduce angle of bank
- Increase thrust up to maximum continuous
- Descend

Optimum Altitude

Optimum altitude is the altitude that gives the minimum trip cost based on cost index, and gross weight. It provides approximately a 1.5 g (approximately 48^0 bank of buffet onset) or better buffet margin.

It is the cruise altitude for minimum cost when operating in the ECON mode, and for minimum fuel burn when in the LRC or pilot-selected speed modes. In ECON mode, optimum altitude increases as either airplane weight or cost index decreases. In LRC or selected speed modes, optimum altitude increases as either airplane weight or speed decreases.

It may be specially advantageous to request an initial cruise altitude above optimum if altitude changes are difficult to obtain on specific routes. This minimizes the possibility of being held at a low altitude / high fuel consumption condition for long periods of time.

Some loss of thrust limited maneuver margin can be expected above optimum altitude. Levels 2000 feet above optimum altitude normally allows approximately 45^0 of bank prior to buffet on set. The higher the airplane flies above optimum altitude, the more thrust margin is reduced. Before requesting / accepting an

altitude above optimum, determine that it will continue to be acceptable as the flight progresses under projected condition of temperature and turbulence.

Projected temperature and turbulence conditions along the route of flight should be reviewed when requesting / accepting initial cruise altitude as well as subsequent step climbs.

ECON cruise is a variable speed schedule that is a function of gross weight, cruise altitude, cost index, and headwind component. It is calculated to provide minimum operating cost for the entered cost index.

LRC is a variable speed schedule providing fuel mileage 1% less than the maximum available. The FMC does not apply wind corrections to LRC.

TURBULENT AIR PENETRATION SPEED

The recommended turbulent air penetration speed schedule : 270 knots below 25,000 feet, 280 knots or 0.82 Mach whichever is lower at 25,000 feet and above. At any time if speed is below 0.82 Mach, ensure that a minimum speed of 15 knots plus the minimum maneuvering speed is maintained. This schedule provides ample protection from stall and high speed buffet, while also providing protection from exceeding structural limits.

Turbulence at or near maximum altitude can momentarily increase the airplanes angle-of-attack and activate the stick shaker. When flying at speeds near the lower amber band, any maneuvering will increase the load factor and reduce the margin to buffet onset and stick shaker.

Fuel for Enroute Climb

The additional fuel required for a 4,000 ft enroute climb varies from 225 to 450 kgs depending on the airplane gross weight, initial altitude, air temperature, and climb speed.

Low Fuel Temperature

Fuel temperature changes relative to total air temperature.

The fuel freezing point is the temperature at which the formation of wax crystals appears in the fuel. The Jet A fuel specification limits the freezing point to – 40^0 C maximum, while the Jet A-1 limit is -47^0 C maximum.

In-flight tank fuel temperature must be maintained at least 3^0 C above the freezing point of the fuel being used. The use of Fuel System Icing Inhibitor additives does not change the minimum fuel tank temperature limit.

The rate of cooling of the fuel is approximately 3^0 C per hour, with a maximum of 12^0 C per hour possible under the most extreme conditions.

Total air temperature can be raised in the following three ways, used individually or in combination :

- Climb or descend to a warmer air mass
- Deviate to a warmer air mass
- Increase Mach number

It takes from 15 minutes to an hour to stabilize the fuel temperature. In most cases, the required descent would be 3,000 feet to 5,000 feet below optimum altitude. In more severe cases a descent to altitudes of 25,000 feet to 30,000 feet might be required. An increase of 0.01 Mach results in an increase of 0.5^0 to 0.7^0 C total air temperature.

Cruise Performance Economy

The flight plan fuel burn from departure to destination is based on certain assumed conditions. These include takeoff gross weight, cruise altitude, route of flight, temperature, wind enroute, and cruise speed.

Actual fuel burn should be compared with the flight plan fuel burn throughout the flight.

The planned fuel burn can increase due to :

- Temperature above planned
- A lower cruise altitude than planned
- Cruise altitude more than 2,000 feet above optimum altitude
- Speed faster than planned or appreciably slower than long range cruise speed when long-range cruise was planned
- Stronger headwind component
- Fuel imbalance
- Improperly trimmed airplane
- Excessive thrust lever adjustments

Cruise fuel penalties include :

- ISA + 10^0 C : 1% increase in trip fuel
- 2,000 feet above optimum altitude : 1% to 2% increase in trip fuel
- 4,000 feet below optimum altitude : 4% to 5% increase in trip fuel
- 8,000 feet below optimum altitude : 12% to 14% increase in trip fuel
- Cruise speed M.01 above scheduled : 1% to 2% increase in trip fuel

For cruise within 2,000 feet optimum, long range cruise speed can be approximated by M.84. Long range cruise also provides best buffet margin at all cruise altitudes.

Chk appropriate w/v & temp inserted for the Flt.Lvl being flown. Tally CFPL (Computerized Flight Plan) with FMS for ETA, FREM / FOD.

Delete any manual VOR selection done during departure. [when no longer reqd.]
Fill up pilot's report , Flt. Report , RVSM report.
Chk ENG out Alt, MEA, nearest alternate. Keep this information updated.
Monitor Wx for closest enroute ALTN / fuel management. Chk raw data Navigation.

The min drag spd = Max endurance spd. The max range spd is slightly higher than the max endurance spd. At any of these speeds any slight atmospheric disturbance will cause spd instability & it will take a long time for the A/C to return to the stabilized spd. To hold speed, frequent thrust lever movement will be reqd resulting in increased fuel consumption. LRC speed is a faster speed than max range spd, with a range penalty of 1% and is preferred in terms of thrust lever manipulations & fuel consumption.

The Opt Alt displayed by the FMS is for the existing spd mode only.
It varies with a change in cruise Mach selected on FMS, while the max Alt does not change for minor changes of speed.

On climbing to an Alt greater than Opt +1500’, the high-speed buffet amber strip appears on the speed scale in the PFD.
To know the time & Dist to climb to the next higher level, dependant on 1.3 g capability,

If at any time a step climb e.g. FL380S is inserted on the LEGS page, at way point ‘X’ then if no climb clearance is given by ATC at ‘X’ and ‘X’ has sequenced, the subsequent waypoints indicate FL 380 while A/C maintains a lower altitude. To correct this anomaly, change the CRZ Alt on the VNAV Pg 2/3 to the present altitude & execute. Opt alt in ECON mode is dependent on cost index and wind component.

Occasionally compare actual burnoff with flight plan burnoff; add the fuel burnt to the FOB to equal fuel at departure.

If an unexplained discrepancy is discovered, a fuel leak should be considered. The fuel leak NN C/L assumes the leak is between the engine strut & the ENG or in the Center Tank on B777-200 non ER airplanes.
Fuel check : fuel used + fuel remaining = fuel at departure.
Compare fuel used on PROG Pg: 2/3 with cumulative burn OFF on CFPL (Computerized Flight Plan).
Compare fuel remaining over destination with FREM / FOD on CFPL (Computerized Flight Plan), provided the planned and actual gross Wt is in close proximity

Last way pt passed fuel remaining can be obtained from the Progress pg 1/3.

For max range CRZ, select cost index to zero and sel ECON.

Bad trim results in more thrust / fuel requirement.

Recommended Rudder Trim Technique

This section describes two techniques for properly trimming the rudder. It is assumed that the airplane is properly rigged and in normal cruise. The primary technique uses rudder trim only to level the control wheel and is an acceptable and effective method for trimming the airplane. It is approximately equal to a minimum drag condition. This technique is usable for normal as well as many non-normal conditions. For some non-normal conditions, such as engine failure with TAC inoperative, this technique is the preferred method and provides near minimum drag.

The alternate technique may provide a more accurate trim conditions when the roll is caused by a roll imbalance. In addition, this technique outlines the steps to be taken if the primary trim technique results in an unacceptable bank angle or excessive rudder trim. The alternate technique uses both rudder and aileron trim to neutralize a rolling condition using the bank pointer as reference.

Note : Large trim requirements may indicate the need for maintenance and should be noted in the airplane log.

Drag Factors Due to Trim Technique

If the control wheel is displaced to the point of spoiler deflection a significant increase in aerodynamics drag results. Additionally, any rigging deviation that results in early spoiler actuation causes a significant increase in drag per unit of trim. These conditions result in increased fuel consumption. Small out of trim conditions affect fuel flow by less than 1%, if no spoilers are deflected.

Note : Aileron trim may be required for significant fuel imbalance, airplane damage, or flight control system malfunctions.

Primary Rudder Trim Technique

It is recommended that the autopilot remain engaged while accomplishing the primary rudder trim technique (using rudder trim only). After completing this technique, if the autopilot is disengaged, the airplane should maintain a constant heading.

The following steps define the primary rudder trim technique :

- Set symmetrical thrust
- Balance fuel if required
- Ensure the autopilot is engaged in HDG SEL or HDG HOLD and stabilized for at least 30 seconds.
- Trim the rudder in the direction corresponding to the down (low) side of the control wheel until the control wheel indicates level. The indices on top of the control wheel should be used to ensure a level wheel condition. The airplane is properly trimmed when the control wheel is level, (zero index). As speed, gross

weight, or altitude change, trim requirements may also change. In a proper trim condition, there may be a slight forward slip (slight bank angle indicated on the bank pointer) and a slight deflection of the slip / skid indicator, which is acceptable.

Alternate Rudder Trim Technique

The alternate rudder trim technique is used if the primary trim technique results in an unacceptable bank angle, excessive rudder trim, or if a more accurate dual axis trim is required.

The following steps define the alternate rudder trim technique :

- Set symmetrical thrust
- Balance fuel if required
- Verify rudder trim is zero
- Ensure the autopilot is engaged in HDG SEL or HDG HOLD and stabilized for at least 30 seconds
- Trim the rudder in the direction corresponding to the down (low) side of the control wheel until the bank indicates level (no bank angle indicated on the bank pointer). Apply rudder trim incrementally, allowing the bank to stabilize after each trim input. Large trim inputs are more difficult to coordinate. The airplane is properly trimmed when the bank angle on the bank pointer indicates zero. If the airplane is properly rigged, the control wheel should indicate approximately level. The resultant control wheel condition indicates the true aileron (roll) trim of the airplane being used by the autopilot.

After completing the alternate rudder trim technique, if the autopilot is disengaged the airplane may have a rolling tendency. Hold the wings level using the sky pointer as reference. Trim out any control wheel forces using the aileron trim switches. If properly trimmed, the airplane holds a constant heading and the aileron trim reading on the wheel / column agrees with what was seen while the

autopilot was engaged. Aileron trim inputs require additional time and should be accomplished prior to final approach.

Note : It is observed that when the aircraft is properly trimmed the flaperons indicate zero with flight control synoptic.

For met reports always give wind ° (T) from PROG. Pg 2/3
Wind direction shown on ND is ° (M)

Direct LEGS when cleared by ATC, must be written on the CFPL (Computerized Flight Plan) for the new track, distance to fly and revised ETA to assist in maintaining the reqd Track in case of dual FMC failure.

If ATC wants you to cross a way point at a particular time :
Sel PROG pg. 3/3 [RTA, reqd time of arrival . In the open boxes, insert the way pt at 1L & the RTA in 1R, with suffix 'A' for after, 'B' for before. [Eg. 0527A].

If ATC wants you to descend due traffic : select LRC / max range. Insert current w/v & SAT .
Consider enroute alternates / re-designate a closer Dest. Alternate, to reduce reserve fuel reqmt.

If a W.Pt is passed abeam by > 21 NM, the next waypoint will not sequence. The only way to recover normal track & LNAV is to monitor A/C interception of track. Then down & up selection of the 'TO' way pt and selecting LNAV or to sel - 'INTCPT COURSE TO' the to W.Pt staying in HDG SEL with LNAV Armed. The INTCPT course to will be the normal course from the unsequenced waypoint.

In order to find if a Nav aid is a VOR/VORTAC/TACAN/ADF the Nav aid identifier can be inserted in the 'REF NAV DATA' Pg. On selection the FMS identifies the type of Nav aid.

It may be noted that incase of Flt plan discontinuity the AFDS maintains the last hdg flown and the FMA remains

LNAV as if LNAV is engaged. The EICAS displays FMC msg. CDU scratch pad displays msg 'END OF ROUTE'.

Restricted areas- an airspace of defined dimensions , above the land areas or territorial waters of a state , within which the flight of aircraft is restricted in accordance with certain specified conditions.

> Unable RNP EICAS msg. Sel Init ref /index /POS 2 of 3.
Whenever ANP exceeds RNP, monitor raw data, ascertain position & check x-track error. Inform ATC.

In order to know the min speed possible to maintain –(do not fly below max end spd) select hold at present position. It will display the speed for max endurance. Best speed [do not have to exec.].
Sel cost index zero to obtain max range speed at the ECON speed display.

No of way points remaining in a route is obtained by selecting RTE DATA Pg for that way point / LS the wind prompt / the Pg header gives the sequence # of the selected way pt and remaining way pts. E.g. 3/29.

In order to check the enroute DTG to a particular way pt in the Flt plan, down sel the W.Pt / select PROG. Pg. 1/3. Line sel W.Pt in place of Dest to obtain the enroute Dist. This is a temporary sel only as it will default to Dest on leaving the pg or the entry may be deleted.

A descent requirement resulting into ECON descent causes VNAV pages 2/3 to be lost. Select page 1/3, reinsert CRZ alt this will make 2/3 available for CRZ mode selection and generation of new TOD.

After the FMS has changed to descent phase, in case, the level flight is now desired, re-insert the cruising Alt in VNAV pg. 2/3. This will re-complete the T/D, cabin altitude and re-govern the comfort correction.

When at CRUISE Altitude :-

1. Tally CFPL (COMPUTERIZED FLIGHT PLAN) with FMS for ETA, FREM / FOD. Do not fill up CFPL (Computerized Flight Plan), calculate ETAs, or do any other paper work till settled down at cruise altitude. ETAs if asked by ATC should be given from FMS. Give undivided attention to flight progress, TCAS, R/T instructions. One ND scale should be on 40 NM scale during climb and descent, to appreciate traffic on TCAS, Weather / Terrain. <u>Headset and shoulder harness must be worn from engine start to top of climb and from top of descent to engine switch off.</u>

2. As far as possible at all way points fuel check should be done as follows :-

   i) CBO (Burn off) on Flight Plan tallies with FMS (may be $\pm$ depending on Delta factor).

   ii) FOD on Flight Plan & additional if any tallies with fuel over destination on FMS.

   iii) Check EICAS Fuel Page for any marked discrepancy. When the fuel quantity in left and right main tanks differ by an allowable quantity, the EICAS alert message FUEL IMBALANCE displays. Carry out the fuel imbalance non-normal checklist. <u>Avoid fuel balancing for minor imbalance.</u>

   iv) When settled in cruise, confirm winds have been entered correctly. Incorrect winds will give an incorrect ETA over destination and incorrect fuel over destination (FOD). FOD = Total Fuel before start minus burn off [Burn Off = Taxi fuel + Fuel to destination $\pm$ Delta Factor]. EICAS Message INSUFFICIENT FUEL is displayed when predicted fuel at destination is less than the reserve fuel as entered by the crew in the PERF INIT page

3. PAX announcement should be made at appropriate time. This would be made soon after setting down in cruise after checking with IFS / CIC if the PAX are awake / status of Entertainment programme etc. It could also coincide with the meal service.

4. Brief IFS / CIC regarding any expected turbulence so that cabin crew can plan service accordingly. This could be done before flight after the Met briefing, so that Cabin Crew are fore-warned about any adverse weather. During this briefing also brief IFS / CIC about Cockpit door opening security measures.

5. When flying over high terrain areas and if no adverse weather, the PM should select Terrain Display on the ND with the consent of the Captain.

COMMUNICATION:

COMMUNICATION WITH GROUND PERSONNEL:

Be precise when communicating with ground. Use standard phraseology.
Sel FLT Tx. Communication with ground can also be made via the INTER Switch.
In case of no communication for a reasonable amount of time, cockpit crew shall make all attempts to re-establish communication by selecting "GROUND CREW CALL" on Center CDU. If there is still no response then an RT call can be made to Ground/ Apron control.
When required to re-establish communication between cockpit and ground crew:-
Cockpit initiated:- with aircraft stationary and parking brake set, repeatedly turn ON and OFF all landing/ taxi / turnoff lights. Ground crew shall acknowledge by waving the headset which will be illuminated at night. The ground crew will only approach the airplane from an angle of 45° from the nose when all the landing/ taxi / turnoff / wing lights are OFF.
Ground initiated:-the ground crew shall wave the headset by day and by flashing the signal wands and illuminating the headset at night. The cockpit shall acknowledge by setting the parking brake, repeatedly turning ON and OFF all landing/ taxi / turnoff lights and then switching OFF all landing/ taxi / turnoff / wing lights

PASSENGER ANNOUNCEMENTS :

In general, the passengers are well informed and do not need detailed information on the routing, altitude, speed, temperature, etc. However, the passengers must be kept informed from time to time about the following:

1. *Actual reasons of delay should be conveyed to Passengers along with the estimated extent. This should be updated at frequent intervals, assigning the reason as 'technical' does not convey any meaning to the passenger and an appropriate level of detail must be given. The Captain should however use his discretion to ensure that*

sensitive information which may cause embarrassment to the Company, is handled carefully.

2. *A brief announcement prior to anticipated bad weather/turbulence and another one to relieve the anxiety of the passengers, after the occurrence, explaining briefly the cause (i.e. Clear Air Turbulence/clouding, etc.) would be appropriate.*

3. *Important places of interest or famous geographical features should be pointed out. However, it should be borne in mind that such an announcement may be out of place when passengers are sleeping.*

The Captain must ensure that the Cabin Crew carry out the mandatory safety demonstration and pre-landing procedures. Local information and facilities at the destination must also be announced by the Cabin Crew.

The basic principle should be to keep the passengers informed and make them feel well cared for.

INTER COCKPIT COMMUNICATION:

Maintain a sterile cockpit atmosphere. Use standard phraseology at all times.
All procedural communication within and from the cockpit will be in a common language 'English'.
Crewmembers must call out selections made on the MCP/CDU and their intentions. The other crewmember must acknowledge.
Between crewmembers, communication must be loud and clear. Comm must always be acknowledged clearly and not by hand or body signals/ gestures. Commands must be clear. Audio selections should be such that unwanted frequencies, at that point of time are kept at a lower volume.
Avoid casual & non-essential conversation below 20000' as it reduces crew efficiency & alertness.

All FMA changes except 'HOLD' during T/O are to be announced loud & clear. When ALT, FLCH, V/S is selected the FMA should be

announced as " ALT" "FLCH SPD" "V/S" this improves awareness about the speed window having opened. After being cleared for a direct leg confirm & execute "LNAV AVAIL" –" LNAV CAPTURED" copy the new ETA/Trk/ Dist

A failure to respond intelligently to two calls by any CM is to be understood as a subtle incapacitation.

In which case the other CM, except in situations warranting actions to avoid imminent danger to the A/C, should verify incapacitation & take control of the A/C as per laid down procedures; by announcing "I HAVE CONTROL". Under normal conditions the flight control handover or take over must be announced & acknowledged "I HAVE CONTROL" / "YOU HAVE CONTROL" as the case may be.

COMMUNICATION WITH ATC:

Use standard phraseology at all times.
AI-131/AI-151 is referred to as Air India one.three.one/one.five.one
In the terminal Ctl. areas the pilots must have direct communication with ATC to avoid time lag in compliance of ATC clearances. In the enroute phase a crewmember other than operating crew such as Supy Crewmember may handle radio Comm, subject to basic flight instruments being in view and that he / she is appropriately trained on company aircraft to handle R/T.

Whenever a crew member changes to another radio set for communication, more so for obtaining a flight related clearance, the other crew member must be informed to monitor the active freq and he / she should also monitor the other set for clearance.

Addl. / Supy. Crew occupying Obs seat should monitor R/T by monitoring; reqd radio sets in terminal areas, correct acknowledgement/ compliance of ATC Clx and also monitor Flt & ENG inst. Keep a good lookout during taxi for obstruction and traffic at all times. Squelch may be disabled by keeping pressed the relevant radio tuning Sw for enhanced reception range.

When any cockpit speaker is switched OFF or the volume turned down for any reason e.g. Captain making a PA announcement or First Officer monitoring the weather on another frequency on headset etc. the pilot must clearly announce "On headset, speaker switched LOW". Whilst removing the headsets, turn the speaker back ON and announce "Speaker switched ON, headset removed". {Interphone – OFF (VT-ALA - VT-ALR)}.

Whenever a frequency change is requested by ATC, maintain the old frequency on STANDBY, till communication is established on the new frequency. If no conversation is heard on RT for a reasonable period of time, a call must be made to ATC for a Radio check.

Pilots must guard against pilot induced loss of communication which may occur due to selection of wrong frequency, forgetting to switch ON the speakers after removing the headsets or forgetting to change the frequency at the applicable time etc.
ATC may view a loss of communication with an aircraft as a suspected threat and may cause fighter aircraft to be airborne for interception.

Presently required audio selection must be set at a higher volume than other frequencies being monitored, more so during adverse weather conditions such as when static/ wipers/ auto call-outs and the noise of rain could be a factor to mute/ distort normal radio conversation.

Headsets must be used from emergency briefing on Gnd till TOC with the speaker Vol lowered (Not OFF).
In cruise the speaker volume should be at a compatible level to allow normal crew conversation.
From approach briefing / TOD to shut down C/L the headsets must be used & speaker volume should be turned low.

Distress Frequency 121.5 must be monitored at all times.

On our aircraft whenever PTT is pressed to transmit, the speaker volume is automatically lowered significantly. Hence, whenever any tx is made on active VHF, the headsets must be worn by the

both Pilots and one Pilot must monitor active VHF . (e.g. contacting company 131.9).

Also on ALA-ALR when the INT switch on Control Wheel is latched the speaker volume is significantly lowered. Therefore, when this switch position is used ensure headsets are worn by both Pilots to monitor active VHF.

1. **During startup/ taxi-out/ take-off/ climb/ descent/ approach/ landing/ taxi-in & engine shut down, the crew shall use headsets and also keep the cockpit speakers in 'ON' position at a slightly lower volume, with intercom/ hotmike switch (if available) selected 'ON'.**

2. **During cruise, irrespective of the crew wearing headsets or not, the cockpit speakers will be kept 'ON' and volume adjusted to clear audible level and intercom switch selected 'OFF'. It must be remembered that on aircraft having a intercom/ hotmike switch, the speaker volume reduces considerably when the intercom/ hotmike switch is in ON position. If this switch remains ON and headset is removed, ATC communication may be missed.**

3. **123.45 and other such IFBP frequencies will only be selected on VHF L when out of VHF contact with ATC, i.e. over oceanic airspace, etc. to convey flight safety information and any other operational information only. Proper discipline should be maintained and unnecessary greetings and chatter avoided on any frequency.**

STANDARD CALLOUTS / EMERGENCY / PA ANNOUNCEMENT / R/T PROCEDURES

1. Standard call outs are given for each phase of flight in the SOPs. As a general rule all FMA changes should be called out. All changes to the flight plan, speed or "Direct to" given by

ATC must be called out and acknowledged by the other pilot before execution. During all level changes "1000 ft to level out". During approach, 10000 ft above airfield call out is given at 10,000 ft + Airfield elevation and the Approach checklist and speed reduction to 250 is carried out at this altitude and not at 10,000 AMSL.

2. All PA announcements for crew are executive orders and should be announced in a clear crisp and short manner thus :

   Correct = "Cabin Doors Automatic, cross-check and confirm"
   Incorrect = "Doors to Automatic doors to Automatic Please"

   Correct = "Cabin Crew stations for take off "
   "Cabin Crew stations for landing"
   Incorrect = "Crew take off stations, take off stations please thank you"

   Whenever the IFS / CIC is required urgently announce "IFS to Cockpit".
   Whenever an emergency requires crew to be ready at their stations: "Attention crew at Stations"

   Similarly all communications with ground crew should be in a manner which avoids ambiguity of any sort, for example :
   Correct = "**Parking brakes SET / Released** "
   Incorrect = "Parking brakes on / off "

3. The scope of this chapter is not to give detailed R/T calls or cover the entire R/T procedure in flight. Most pilots who join Air India are already fairly proficient in R/T. However from time to time some incorrect tendencies keep creeping in and this needs standardization. In general all clearances must be read back verbatim in full and with the full callsign. Often there are two aircraft with a similar callsign with the same controller e.g. Air India 301 and Gulf Air 301. If Air India and Gulf Air is dispensed with it can lead to misunderstanding and confusion.

   Example of a Clearance = "Air India 301 climb to FL 150, maintain heading 170, squawk 2315 Ident".

Correct readback = "Climb FL150 maintain heading 170 squawk 2315 Ident Air India 301'.

Incorrect readback = "Upto (down to) 150 **or Climb to 150** maintain 170 squawking 2315 & Identing 301."

As is obvious above, flight level, speed and heading can be confused with each other and so a complete verbatim readback is essential. When handed over to a new frequency be ready with pen and paper to copy clearance. A brief courtesy like Good morning, Good evening, Namaskar is appreciated but avoid extended greetings.

Example of Radar handover to another Radar frequency :
"Lumpur Control Air India 425 descending thru level 190 for FL160" or "Lumpur Control AI-425 level 310"
or "Lumpur control Air India 425, maintaining FL 200, on radar heading 135".

When the radar has identified you he may say "Air India 425 Radar Contact". Standard position reports are thereafter not required.

If not in radar control full position report is required "Mumbai Air India 141 position Sugid at 1315, FL 350 estimating Doget 1340 Next Parar" Check

General : When cleared by ATC to a waypoint which is not in the Database or the crew are not familiar with, ask ATC for a radar heading to that waypoint till such time the crew sort out the FMS. If in doubt at anytime do not hesitate to ask again and clarify.

Remember your conversation is being continuously recorded in the voice recorder. Keep a good lookout during taxiing. No paperwork such as filling up flight report book, pilots report, putting away charts etc to be done during taxi.

Use of words" take off " is restricted to actual take off clearance or its cancellation e.g. "Cleared for take off" or "Cancel, I say again cancel take off " In all other cases it is

referred to as "Departure" e.g. "Are you ready for immediate departure".

8.33 Khz CHANNEL SPACING AND FRQUENCY:
The use of the term "CHANNEL" for 8.33 Khz channels is discontinued. It is essential that the flight crew readback the channel number exactly as given by controller and the controller verify that the Pilot has correctly understood e.g. 132.010 to be readback as "one three two decimal zero one zero".

Frequency List

Spacing (kHz)	Frequencies (MHz)	25 kHz mode "Frequency"	8.33 kHz mode "Channel"
25	**132.0000**	**132.00**	**132.000**
8.33	132.0000	-	132.005
8.33	132.0083	-	132.010
8.33	132.0167	-	132.015
25	**132.0250**	**132.02**	**132.025**
8.33	132.0250	-	132.030
8.33	132.0333	-	132.035
8.33	132.0417	-	132.040
25	**132.0500**	**132.05**	**132.050**
	etc		

PUSH BACK, START UP AND TAXI OUT

It is an acknowledged fact in the industry that pushback and engine start is a hazardous procedure. Misunderstandings between the cockpit and ground crew can lead to serious accidents, injury to personnel or damage to aircraft or equipment. All personnel involved in the operation have to be extremely vigilant at all times and strictly adhere to the procedure.

- Clearance for pushback shall be taken from the appropriate ground/ tower frequency.
- After completion of before start checklist:

  - Captain asks the ground "Confirm A/c clear, all doors closed. Nose gear steering locked out."
  - Ground checks and replies "A/c clear all doors closed."
  - Captain: "Clear to pushback facing……."
  - Ground: "Pushback facing………. Release parking brakes."
  - Captain: "Parking brakes released."
  - Ground: "Commencing pushback"

If engine starting is authorised during pushback by the ATC and by the ground personnel, engine start up may be accomplished as per the procedure in the FCOM and SOP. If one engine is started in the bay and for starting remaining engine, requires the running engine to be run up above idle to increase duct pressure, the remaining engine should be started only after completing pushback. Engine should not be operated above idle during pushback.

Note : Refer to Supplementary Procedures for Eng. Cross Bleed Start

For startup, the following calls should be used.

Captain "Ground start sequence will be right / left engine."

Ground "Start sequence right / left."

Captain "Stand by"

Ground "clear to start right"

Captain "starting right" etc.

Similarly clearance is requested for the other engine startup.

ON COMPLETION OF PUSHBACK

The following calls will be used.

Ground "Pushback completed. Apply parking brake."

Captain "Parking brakes set".

ON COMPLETION OF STARTUP

Captain "Remove all external sources, verify Nose Gear steering not locked, hand signals on left / right, chocks off time _______Z."

Ground "Tractor, towbar, Nose Gear steering pin removed, removing chocks, hand signals on left/ right side, goodbye."

INTERRUPTION OF PUSHBACK

In case there is any problem and the tractor has not been disconnected, the ground personnel will indicate to the cockpit crew as follows:

"Standby, tractor NOT disconnected…." etc.

PRIOR TO TAXI

The Captain must not release parking brakes until the mechanic/ marshaller has given thumbs up signal on the left/ right side, after start checklist is completed and ATC clearance has been obtained.

One person from the ground crew must be designated as marshaller and give thumbs up signal, or at night with marshalling flash light wand and await till the aircraft taxies out. The Captain will acknowledge the signal of the ground crew by instructing the PM to switch on the taxi / turn off lights.

All actions must be deliberate and unhurried. There should be no hurry to taxi out. It must be ensured that the ground crew has moved away well clear and thumbs up signal has been obtained. The ground crew on their part must constantly inform the cockpit crew of all the things that are happening down below as an extensive portion below the nose is not visible from the cockpit. If any operation such as disconnecting tow bar etc. is interrupted or delayed, the ground crew must call up on the intercom and inform the Captain. In case of no communication with the ground crew for a reasonable period of time the cockpit crew should also make all attempts to re-establish communication by sounding the horn etc. If there is still no response from the ground, the ground/ apron control should be contacted on R/T. Following ambiguous terminology must never be used.

Parking brake ON/OFF **(incorrect)**

The correct terminology is ;

Parking brake set **(correct)**

Parking brake released **(correct)**

Typical R/T Procedure Sector Mumbai / Muscat

(Crew is advised to keep updated with the latest revisions on R/T procedures.)

A/c (121.85)	:	"Mumbai delivery AI-901 Destination Muscat FL 360 Bay 51 Info Golf total 196 ("Security Check completed" – only at Indian Stations) Request clearance."
Dly (121.85)	:	"AI-901 cleared to Muscat, N571, FL 300, sugid 4 Dep, Climb to FL 140 with SID restrictions, Squawk 0352."
A/c	:	"AI-901 cleared to Muscat, N571, FL 300, sugid 4 Dep, Climb to FL 140 with SID restrictions, Squawk 0352."
Dly	:	"AI-901 read back correct, contract GND on 121.9 for push back and start clearance."
A/c	:	"121.9, AI-901."
Gnd (121.9)	:	"Mumbai ground AI-901, Bay 51, request push back and start clearance."
Gnd	:	"AI-901 push back facing East, startup on completion of push back."
A/c	:	"Push back facing East startup on completion of push back AI-901"
A/c	:	"Mumbai ground AI-901 request taxi"
Gnd	:	"AI-901 taxi via F1 Hotel A4 to holding point R/W 27"
A/c	:	"Taxi via F1 Hotel A4 to holding point R/W 27 AI-901"

Gnd	:	"AI-901 Hold short R/W 27, contact Mumbai tower on 118.1."
A/c	:	"AI-901 Hold short R/W 27, contact Mumbai Tower on 118.1."
A/c (118.1)	:	"Mumbai tower AI-901 on A4."
Tower	:	"AI-901 Mumbai tower, are you ready for immediate departure"
A/c	:	"Ready for immediate departure AI-901"
Tower	:	"AI-901, confirm Jet Air 737 on short final in sight line up and wait behind."
A/c	:	"Jet Air 737 on finals in sight, line up and wait behind AI-901"
Tower	:	"AI-901 surface wind 260 at 8kts, cleared for take off
A/c	:	"Cleared for take off AI-901"
Tower	:	"AI-901 change over to Mumbai Approach 127.9"
A/c	:	"127.9 Good day AI-901"
A/c (127.9)	:	"Mumbai Approach AI-901 passing 2500 ft for 70 sugid 4 Dep, Squawk 0352."
Appr	:	"AI-901, Radar contact, Climb to FL 140 unrestricted."
A/c	:	"Climb to flight level 140 unrestricted AI-901"
Appr	:	"AI-901 change to Mumbai Control 132.7"

A/c	:	"Mumbai Control on 132.7 AI-901"
A/c (132.7)	:	"Mumbai Control AI-901 FL 140"
Ctr (132.7)	:	"AI-901 Mumbai Ctr, Continue Climb to FL 360, report reaching by Bimot"
A/c	:	"Climb to FL 360 report reaching by Bimot AI901"
A/c	:	"Mumbai Control AI-901 Fl 360 maintaining, estimate Bimot at 0702"
Ctr	:	"AI-901 report Bimot FL 360"
A/c	:	"Mumbai Control AI-901 Position Bimot 0702 FL 360 estimate Sugid 0710 and Parar 0746"
Ctr	:	"AI-901 change over to Mumbai Radio on 8879 primary 10018 secondary"
A/c	:	"Mumbai Radio 8879 primary 10018 secondary AI-901"
A/c (8879)	:	"Mumbai Radio AI-901 on 8879"
Mumbai (8879)	:	"AI-901 Mumbai Go ahead"
A/c	:	"Mumbai AI-901 Position Sugid 0710 FL 360 Estimate Doget 0723, estimate Parar 0746 selcal JMCF"
Mumbai	:	"AI-901 Mumbai, Sugid 0702 FL 360 Estimate Doget 0723, Parar 0746 checking selcal"
		After a pause Selcal chime heard "Ding Dong"--- then:-

A/c	:	"Selcal okay AI-901"
Mumbai	:	"AI-901 call Doget"
A/c	:	"Mumbai AI-901 on 8879 position"
Mumbai	:	"AI-901 go ahead"
A/c	:	"AI-901 position Doget 0724 FL 360 estimate Parar at 0747"
Mumbai	:	"AI-901 position Doget at 0724 FL 360. Estimate Parar at 0747. Call position Parar."
A/c	:	"Call position Parar AI-901."
A/c	:	"AI-901 position Parar at 0747 FL 360. Estimate MCT at 0814."
Mumbai	:	"AI-901 position copied continue with Muscat Control on 123.95."
A/c (123.95)	:	"Muscat Control AI-901 FL 360"
Muscat	:	"AI-901 squawk 6671"
A/c	:	"Squawk 6671 AI-901"
Muscat	:	"AI-901 Radar Contact Report for descent"
A/c	:	"Will call for descent AI-901"
A/c	:	"Muscat AI-901 request descent clearance"
Muscat	:	"AI-901 descend to FL 210"

A/c	:	"Descend to FL 210 AI-901"
Muscat	:	"AI-901 descend and maintain FL 160 change to Approaoch on 121.2"
A/c	:	"Descend & Maintain FL 160 over to Approach 121.2 good day AI-901"
A/c (121.2)	:	"Muscat Approach, AI-901 passing level 180 for 160"
Seeb Appr (121.2)	:	"AI-901 Muscat approach, Radar Contact continue descent to 8000 ft QNH 1008 Turn right hdg 300 Radar Vectors ILS 26"
A/c	:	"Descend to 8000 ft. QNH 1008 Right hdg 300 Radar Vectors ILS 26 AI-901"
Appr	:	"AI-901 continue descent to 3000 ft on hdg 300 cleared for ILS 26 Report established"
A/c	:	"Continue descent to 3000 ft on hdg 300 cleared for ILS 26 Report established AI-901"
A/c	:	""Established ILS 26 AI-901"
Appr	:	"AI-901 Continue on ILS, contact tower on 118.4"
A/c	:	"Continue on ILS contact tower 118.4 AI-901"
A/c (118.4)	:	"Muscat tower AI-901 established ILS 26"
Seeb Tower	:	"AI-901 Muscat tower good afternoon,

		wind 270 at 8 kts. Cleared to land 26"
A/c	:	"Cleared to land 26 AI-901"
A/c	:	"Runway vacated AI-901"
Tower	:	"AI-901 taxy via Alfa and C2 to Bay 5 contact ground on 121.8"
A/c	:	"Taxy via Alfa and C2 to bay 5,contact ground on 121.8"
A/c (121.8)	:	"Muscat ground, AI-901 on Alfa."
Seeb Gnd (121.8)	:	"AI-901 taxy as cleared. Report your registration marks"
A/c	:	"Taxy via Alfa and C2 to bay 5 Registration marks VT-ALK"

LONDON DEPARTURE

A/C (121.97)	:	"Heathrow Delivery AI-102 B777 Stand 327 QNH 1020 Info Bravo Ready for start"
Delivery (121.97)	:	"Heathrow Delivery AI-102 Start approved - Dover 6J Squawk 6356 when ready to push contact 121.7"
A/c (121.7)	:	"Heathrow Ground AI-102 stand 327 ready to push back"
Gnd (121.7)		"AI-102 cleared to push back"
A/C	:	"Cleared to push back AI-102"
A/C	:	"Heathrow Ground AI-102 Taxy"
Gnd	:	"AI-102 cleared taxy first left onto Foxtrot, link 36 to Echo then Alfa to hold at Horka & give way to Star Airbus 320 crossing Right to Left"
A/C	:	"Cleared taxy first left onto Foxtrot, link 36 to Echo then Alfa to hold at Horka & give way to Star Airbus 320 crossing Right to Left , AI-102"
Ground	:	"AI-102 monitor Tower on 118.5."
A/C	:	"Monitor Tower on 118.5 AI-102"
		NOTE: AI-102 changes to tower 118.5 and does not call (just monitors)
Tower (118.5)	:	AI-102 follow the British Airways 321 to holding point 9R
A/C	:	Follow the British Airways 321 to holding

		point 9R AI-102
Twr	:	AI-102 after the BA 777 on the other side of the R/w departs line up 9R
A/C	:	After the BA 777 on the other side of the R/w departs line up 9R AI-102
Twr	:	AI-102 winds 030/5 cleared for T/O 9R
A/C	:	Cleared for T/O 9R AI-102
Twr	:	AI-102 contact London 120.52
A/C	:	"Contact London 120.52, AI-102"
A/C (120.52)	:	"London Control AI-102 out of 2200 for 6000 Dover 6J
London Control (120.52)	:	AI-102 London you are cleared FL 150 No speed restriction, Ident.
A/C	:	Cleared FL 150 No speed restriction, Ident AI-102.
London Control	:	AI-102 Turn Right on hdg 120 Climb FL 290 Contact London 132.355
A/C	:	Turn Right on hdg 120 Climb FL 290 change to, London on 132.355 AI-102"
A/C (132.355)	:	"London AI-102 out of FL 150 for FL 290 Radar heading 120"
London Control (132.355)	:	"AI-102 Direct to Dover climb to FL 330"

LONDON ARRIVAL

A/C	:	London Control AI-101 FL 380
London Control	:	AI-101 London cleared to London lambourne 3A Arrival
A/C	:	Cleared to London via lambourne 3A Arrival AI-101
London Control	:	AI-101 direct to lambourne descent FL 240 to be level abeam Logan
A/C	:	AI-101 direct to lambourne descent FL 240 to be level abeam Logan
London	:	AI-101 continue descent to FL 100 cross FL 150 abeam Saber
A/C	:	Continue descent to FL 100 cross FL 150 abeam Saber AI-101
London	:	AI-101 hold at LAM expectt 10 min holding delay. Change to Heathrow Director 119.72
A/C	:	Hold at lambourne 10 min, over to Director 119.72 AI-101
A/C (119.72)	:	Heathrow Director AI-101 B777 Information Bravo, QNH 1020
Heathrow Director (119.72)	:	AI-101 Turn left direct LAM Leave LAM Hdg 270^0 speed 220 R/W 09L
A/c	:	Turn left direct LAM Leave LAM Hdg 270^0 speed 220 R/W 09L, AI-101
Director	:	AI-101 Descend to 4000 ft on QNH 1020 change to Approach 120.4 with call sign only

A/C	:	Descent to 4000 ft QNH 1020 Approach 120.4 AI-101
A/c (120.4)	:	Heathrow Approach AI-101
Approach (120.4)	:	AI-101 Heathrow you have 25 track miles, Descend to 3000 feet, speed 180 kts
A/c	:	Descent to 3000' speed 180, 25 track miles AI-101
Approach	:	AI-101 turn left 130^0 call established on localizer 09L
A/C	:	Left 130^0 will call established on localizer 09L AI-101
A/c	:	Established localizer 09L AI-101
Approach	:	AI-101 cleared for the ILS 09L Maintain 160 kts till 4 DME contact tower 118.5
A/c	:	Cleared for the ILS 09L Maintain 160 kts till 4 DME contact tower 118.5 AI-101
A/c (118.5)	:	Heathrow tower AI-101 established ILS 09L
Twr (118.5)	:	AI-101 Heathrow tower, continue Approach, wind 050 at 10, expect ldg clearance on short finals
A/C	:	Continue Approach AI-101
Twr	:	AI-101 cleared to land 09L
A/c	:	Cleared to land 09L AI-101
Twr	:	AI-101 clear on first right contact

		Ground 121.9
A/c	:	Clear on first right contact Ground 121.9 AI-101
A/C (121.9)	:	"Heathrow Ground AI-101"
Heathrow Ground (121.9)	:	AI-101 Heathrow. Turn Right on Alfa hold short of Echo behind the Virgin 340, your bay No 327 is still occupied.
A/c	:	Turn Right on Alfa hold short of Echo behind the Virgin 340, bay No 327 occupied AI-101.
Gnd	:	AI-101 Taxi via Echo Fox Golf to stand 327 after the United 777 passes left to right on Golf.
A/C	:	Taxi via Echo, Fox Golf to stand 327 after United 777 passes Left to Right on Golf AI-101

List of Standard RTF words / phrases and their meanings

Words/phrases	Meaning
Acknowledge	Let me know that you have received and understood this message
Affirm	Yes
Approved	Permission for proposed action granted.
Break	I hereby indicate the separation between portions of the message.
Break Break	I hereby indicate the separation between message transmitted to different aircraft in a very busy environment.
Cancel	Annul the previously transmitted clearance.
Check	Examine a system or procedure (No answer is normally expected e.g. "Check your minima")
Confirm	Have I correctly received the following ….. ?
Contact	Establish radio contact with ……….
Disregard	Consider that transmission as not sent
Monitor	Listen out on frequency……….(Note the difference from "Contact") Frequently used at busy airports such as London, etc
Negative	"No" or "Permission not granted" or "that is not correct"
Read back	"Repeat all exactly as received (Note : All ATC clearance have to be read back even if not specifically asked for)

Words / phrases	Meaning
Recleared	A change has been made to your last clearance and this new clearance super cedes your last clearance
Runway Vacated	Clear of runway
Roger	I have received your last transmission (Note : Never to be used where a Read back or a direct answer is Affirm or Negative is required.)
Request	Pass me the following information
Request	I should like to know………….
Say again	Repeat all or following part of your last transmission.
Speak more slowly	Reduce your rate of speech
Stand by	Wait and I will call you
Verify	Check and Confirm
Wilco	Abbreviation for "will comply"

CONTROL DISPLAY UNIT (CDU) PROCEDURES

During high workload times, for example departure or arrival, try to reduce the need for CDU entries. Do this by using the MCP heading, altitude, and speed control modes.

ALTIMETER SETTING

ALTIMETER SETTING PROCEDURES, TEMPERATURE CORRECTION (JEPPESEN- ATC): The calculated minimum safe altitudes/ heights must be adjusted when the ambient temperature on the surface is much lower than Standard atmospheric conditions. Upto –15ºC an approx 4% height increase for every 10ºC below standard temperature as measured at the altimeter setting source is safe. For colder temperatures use the table given below.

Pilots must co-ordinate with air traffic control before applying altimeter temperature corrections during cold weather operations. For very cold temperatures, when flying published minimum altitudes significantly above the airport, altimeter errors can exceed 1000 feet, resulting in potentially unsafe terrain clearance if no corrections are made.

VALUES TO BE ADDED BY THE PILOT TO MINIMUM PROMULGATED HEIGHTS/ ALTITUDES:

AERO-DROME TEMP (⁰C)	Height above the elevation of the altimeter setting source													
	200	300	400	500	600	700	800	900	1000	1500	2000	3000	4000	5000
0	20	20	30	30	40	40	50	50	60	90	120	170	230	280
-10	20	30	40	50	60	70	80	90	100	150	200	290	390	490
-20	30	50	60	70	90	100	120	130	140	210	280	420	570	710
-30	40	60	80	100	120	140	150	170	190	280	380	570	760	950
-40	50	80	100	120	150	170	190	220	240	360	480	720	970	1210
-50	60	90	120	150	180	210	240	270	300	450	590	890	1190	1500

DESCENT:
DESCENT PREPARATIONS:

PRIOR TO A DESCENT:

Entering an arrival procedure or an Alt constraint at a way point provides a TOD pt.
At least one Alt constraint below CRZ Alt should be available, to generate the descent guidance path, which is built upward from the lowest constraint. Must chk on ND plan mode & see the display.
DTG & time of TOD on PROG & VNAV Pg 2/3, when 350NM (approx.) from TOD, if arrival is selected.

To plan the ideal TOD, the descent should be based on idle thrust & lowest spd compatible with ATC. A/C Wt., W/V, temp can alter the descent profile. It is more economical to slightly overshoot & correct with speed brakes than to slightly undershoot & having to increase thrust.
At times if descent spd restriction is deleted or changed, then enroute w/v may disappear & ETA changes, so insert w/v again.

This becomes obvious by a difference in ETA & a change in fuel remaining over Dest.

During descent, in the northern hemisphere, winds back & reduce in speed. Insertion of descent winds is as per the 18000' / 500 HP chart if provided / enter forecast winds for descent or an interpolation of winds aloft & surface winds .

Start the Descent Procedure before the airplane descends below the cruise altitude for arrival at destination.

Recall/Review/ref.spd/RTE 2 for Alternate.

Arrival : Select R/W, STAR, transition / SPD - ALT constraints / NAVRAD Page set / x-check ILS frequency & course / VOR frequency and course NDB frequency / Select VOR-ADF display as required on ND. MDA / Preselect QNH/ Autobrakes/ HOLD Speed

/ tally LEG distance / missed APP LEGs x-check on ND in PLAN mode / SPD ALT constraints.

> Do not use Nav aid facilities that are out of service, as per NOTAM, even though Flt deck indications appear normal. There is no warn on the Flt deck when erroneous Nav aid transmissions are received. Inhibit these Nav aids on the ref Nav data page.

When configuring the FMS for arrival at the destination airport, the crew should select the predicted R/W, appropriate STAR. However, the transition is to be selected with ATC clearance. This would lead to a discontinuity which can be left as it is, till further is obtained from ATC.

For Arrivals at airports, where Transition Level is given by ATC or ATIS, select the transition level on VNAV 3 FORECASTS in feet. Enter Predicted Winds.

Approach briefing must include:
Applicable NOTAMS review / Dest & ALTN Wx VOLMET / ATIS / TOD/ Alt, speed & noise restrictions / MEA / Tr. Lvl.

For arrivals at airports, where Tr. Lvl is given by ATC or ATIS : select the transition level on VNAV Pg 3 forecasts in feet. Eg. 5000' / tally details on hold pg. (s) / MSA / DA - MDA - DH / Arr Proc/ visual cues on APP / braking co-efficient - action / AUTO Brk sel / visual cues on approach / exp. Taxi routing / Bay docking sys./ Missed APP. Proc – actions – mode selection / windshear / approach to stall go around / reserve fuel / diversion routing to ALTN. [RTE 2].

DESCENT PLANNING :

Proper descent planning is necessary to arrive at the desired altitude at the proper speed and configuration.

The crew should at all times maintain awareness of the destination weather and traffic conditions. It is imperative that

the requirements of a potential diversion be kept in mind at all times.

DESCENT PATH

An FMC path descent is the most economical descent method. At least one waypoint-related altitude constraint below cruise altitude on a LEGS page generates a descent guidance path. The path is built from the lowest constraint upward, assuming idle thrust, or approach idle below the anti-ice altitude entered on the DESCENT FORECAST page.

The path is based on the descent speed schedule, any entered speed / altitude constraints or forecast use of anti-ice / descent winds. The path reflects descent wind values entered on the DESCENT FORECAST page.

The descent constraint may be automatically entered in the route when selecting the arrival procedure or can be manually entered through the CDU. The crew can use VNAV speed intervention on the MCP for any ATC speed change requirement.

OFF PATH DESCENT :

The off path descent page allows the analysis of descent performance off the present route of flight, direct to a selected waypoint. Data entered on the page shows clean and drag descent ranges on the page and on the ND. The ranges are based on an entered waypoint and altitude constraint. The range can be used to determine if the altitude constraint can be met in a direct descent to the waypoint.

The FMC puts the last descent waypoint with an altitude constraint into DES TO.

Descent Rates

Descent Rates tables provide typical rates of descent below 20,000 feet with idle thrust and speedbrakes extended or retracted.

Target Speed	Rate of Descent (Typical)	
	Clean	With Speedbrake
M 0.84 / 310 knots	2200 fpm	5300 fpm
250 knots	1400 fpm	3300 fpm
VREF 30 + 80	1000 fpm	2300 fpm

Losing airspeed can be difficult and may require a level flight segment.

The crew should be aware that it requires approximately 60 seconds and 6 NM to decelerate from 310 to 250 knots in level flight without speedbrakes. An additional 50 seconds and 4 NM are required to decelerate to flaps up maneuvering speed at average gross weights. Using speedbrakes to aid in deceleration reduces these times and distances by approximately 50%.

Speedbrakes

The pilot flying, as a good technique, should keep a hand on the speedbrake lever when they are used in-flight, as a remainder of it being extended.

While using the speedbrakes in descent, allow sufficient altitude and airspeed margin to level off smoothly. Speedbrakes should be retracted before reaching 1,000 feet of selected altitude. When descending with the autopilot engaged and the speedbrakes extended speeds near VMO / MMO, the airspeed may momentarily increase to above VMO / MMO if the speedbrakes retracted quickly. When the speedbrakes are retracted during altitude capture near VMO / MMO, a momentary overspeed condition may occur. To avoid this condition, it may be necessary to reduce the selected speed and or descent rate prior to altitude capture or reduce selected speed and delay speedbrake retraction until after level off is complete. Avoid using

speedbrakes in level flight if a momentary excursion, into VMO / MMO, occurs during level flights due to turbulence.

Use of speedbrakes with flaps greater than 5 should be avoided.

Flaps and Landing Gear

Flaps are normally not used for increasing the descent rate.

Each additional minute of flaps down maneuvering consumes approximately 110 kg of additional fuel with the gear retracted and 125 kg with the gear extended.

Normal descents are made in the clean configuration to pattern or instrument approach altitude. If greater descent rates are desired, extend the speedbrakes or if higher than normal descent rates are required by ATC clearance, the landing gear can be lowered to increase the rate of descent. However, avoid using the landing gear for increased drag above 200 knots. This minimizes passenger discomfort and increases gear door life.

Engine Icing During Descent

Note: The engine anti-icing system should be AUTO or ON whenever icing conditions exist or are anticipated. Failure to follow the recommended anti-ice procedures can result in engine stall, over temperature or engine damage.

Speed Restrictions

Speed restrictions below specific altitudes / flight levels and in the vicinity of airports are common. Pilots to familiarize themselves with airport specific speed restrictions. When speed lower than the minimum maneuvering speed is required, crew should try to obtain clearance to maintain higher speed from ATC. If not, flaps can be extended. However, this results in increase of fuel consumption.

CONTINUOUS DESCENT APPROACHES (CDA)

Noise and Track keeping (NTK) monitoring system at London airports integrates noise monitoring by microphones and recording of Continuous Descent Track Profile by SSR.

When the descent below the stack level is commenced, estimates of distance to touchdown are provided by the Radar Controller. At Heathrow CDA achievement monitoring commences from 5500 ft. (ML) along with ATC Speed Control for management of airspace and R/W capacity; by regulating 220 Kts up to 20 NMs to touchdown / 180 Kts upto 10 NMs to touchdown / 160 Kts upto 04 NMs to touchdown

As per UK AIP there is no restriction to the minimum ROD below Transition Altitude that a Pilot in his judgement may choose for the purposes of CDA with the objective of joining glide path at appropriate height for the distance without recourse to level flight. Any segment of flight below 6000 ft having a height change of not more than 50 ft over a track distance of 2 NMs or more is likely to be recorded as level flight in the NTK monitoring system and will be considered as Non-CDA.
Nothing in this procedure shall take precedence over the requirement for safe operation and control of aircraft at all times.

1. FMS Programming:

a) Manually enter a speed/ altitude constraint of 180/ 2500 at CI fix. Vertical deviation scale of the VNAV PATH can be used as guidance until distance to touch down is given by A TC or G/S becomes alive.

b) All other hard constraints between the holding fix and the above fix should be deleted.

Note : For ILS approaches R/W INTC (R/W centerline extension) if selected, would result in VNAV guidance producing a descent below the ideal CDA.

2. Flying the CDA:

a) Flaps should be used for maintaining ATC speed and not as a means of drag i.e. to increase the ROD or selected in advance for the next expected speed schedule.

b) Speed Brakes should be considered as a preferred method of increasing the drag to maintain VNAV PATH/ Glide Path.

c) Landing Gear: Unless there are other abnormal conditions requiring early selection, the Landing Gear should normally be lowered between 2000-1800 ft (AAL). This also ensures LP/LD approach until after glide slope interception.

d) VNAV Mode is recommended by BAA to achieve an efficient CDA during the Initial and Intermediate phases of approach. However, our trial approaches have shown better CDA control in V/S mode. Always select a lower altitude prior to commencing a descent in V/S Mode. Therefore, as soon as distance to touch down is given following modes should be used to achieve a CDA.

e) V/S Mode should be used to maintain or fly towards the glide path from below. However, ROD must not be less than what is required to achieve a height change of 50 ft over a track distance of 2 NMs.

f) FLCH Mode is not a preferred means to achieve a CDA. However, if there is a requirement to increase ROD from what is followed in idle open descent, the same may be achieved by selecting FLCH mode with speedbrakes.

g) Final Landing Configuration should be achieved by about 1500 ft (AAL) and all landing dry runs and checklists completed by 1000 ft (AAL).

h) Reverser application should be regulated commensurating with stopping and R/W occupancy requirements.

THUMB RULES: - TO REDUCE ROD - USE V/S MODE
TO INCREASE ROD IN IDLE - USE FLCH MODE & SPD BRAKES
MIN ROD BELOW 6000 FT - AT 220 Kts - 200 FPM
- AT 180 Kts -100 FPM

To achieve proficiency in above procedures, crews are advised to regularly practice LP/LD Approach procedures at other relatively less congested airports.

Holding

Crew should reduce airspeed at least 3 minutes before the holding fix (In LNAV & VNAV, this speed reduction is automatic.) so that the airplane crosses the fix, initially, at or below the maximum holding airspeed.

If the FMC holding speed is greater than the ICAO or FAA maximum holding speed, holding may be conducted at flaps 1, using flaps 1 speed. **Flaps 1 uses approximately 7% more fuel than flaps up**. Holding speeds in the FMC provide an optimum holding speed based upon fuel burn and speed capability, but in no case are lower than flaps up maneuvering speed.

Holding Airspeeds not available from the FMC.

If holding speed is not available from the FMC, refer to the PI Section of the QRH. If time does not permit immediate reference to the QRH, the following speed schedule may be used temporarily. This simplified holding speed schedule may not match the FMC or QRH holding speeds because the FMC and QRH holding speeds are based on many conditions that cannot be generalized into a simple schedule. However, this schedule provides a reasonable approximation of minimum fuel burn speed with approximate margins to initial buffet.

Recommended holding speeds can be approximated by using the following guidance until more accurate speeds are obtained from the QRH.

- Flaps up maneuvering speed approximates minimum fuel burn speed and may be used at low altitudes.
  B777-200
- Above FL 250, use VREF 30 + 100 knots to provide adequate buffet margin.
  B777-200LR, B777-300 ER
- Above 10,000 ft., use VREF 30 + 120 knots to provide adequate buffet margin.

The above guidelines may be used to set initial clean speed if ATC requires speed reduction to minimum clean.

ICAO Holding Airspeeds (Maximum)

Altitude	Speed
Through 14,000 feet	230 knots
Above 14,000 to 20,000 feet MSL	240 knots
Above 20,000 to 34,000 feet MSL	265 knots
Above 34,000 feet MSL	.83 Mach

FAA Holding Airspeeds (Maximum)

Altitude	Speed
Through 6,000 feet MSL	200 knots
6,001 feet MSL through 14,000 feet MSL	230 knots (210 knots Washington D.C & New York FIRs)
14,001 feet MSL and above	265 knots

Maintain clean configuration if holding in turbulence. Clean configuration is also recommended for holding in icing conditions. However, to comply with speed restrictions, flaps 1 may be used in icing.

Note : Whenever holding is anticipated at destination airports, Pilots to uplift extra fuel as per guidelines laid down in the Operations Manual.

APPROACH CATEGORY

FAA Category	Speed
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
Speed – based upon a speed of VREF in the landing configuration at maximum certificated landing weight.	

ICAO Category	Range of Speeds at Threshold	Range of Speeds for Initial Approach	Range of Speeds for Final Approach	Max Speeds for Visual Maneuvering (Circling)	Max Speeds for Missed Approach	
					Intermediate	Final
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
Speeds at threshold – based upon a speed of VREF in the landing configuration at maximum certified landing weight.						

The designated approach category for an aircraft type is defined by the landing reference speed (VREF) at the maximum certified landing weight under both USA and ICAO criteria.

Under USA criteria, an aircraft approach category is used for straight-in approaches only. For circling approaches, the anticipated circling speed at the actual weight is used to determine the required approach minimums. Circling approach minimums are normally published on instrument procedures charts as a function of maximum airplane speeds for circling in lieu of airplane approach categories.

Under ICAO criteria, an aircraft approach category is used for both straight-in and circling approaches to determine the required

approach minimums. The aircraft category for a circling approach may be different than that for a straight-in approach.

777-200, 777-200LR

- The 777-200 series airplanes are classified as Category "C" airplanes for straight-in approaches.

777-300, 777-300ER

- The 777-300 series airplanes are classified as Category "D" airplanes for straight-in approaches.

Circling approach minimums for both USA and ICAO criteria are based on obstruction clearance for approach maneuvering within a defined region of airspace. The region of airspace is determined as a function of actual airplane speed. This region gets larger with increasing speed, which may result in higher approach minimums depending on the terrain characteristics surrounding the airport. Similarly, approach minimums may decrease as speed is reduced. However, the use of different circling approach minimums based on actual approach speeds does not change the designated approach category of the airplane.

Do not attempt an approach if reported braking action is poor, except in an emergency.
During APP phase the RNP = 0.3 NM. If 'UNABLE RNP' msg is displayed during arrival, the raw data must be closely monitored to ensure proper track keeping.
Monitor APP Clx & display the related APP chart only. Confirm minima.
CAT I DA is referenced to Pr altimeter and CAT II DH is referenced to radio altimeter.
ILS (FPA) GS limits for Autoland are: 3.25° - 2.5°.
Max wind speeds for Autoland: HWC 25 kts. , X-Wind 25 kts. , TWC 10 kts. (HWC = 70 % of 45° X- wind).

EXTENDING THE CENTERLINE

When being radar cevtored for an approach extend the centerline prior to intercepting finals.

This provides :-

- a simplified navigation display.
- a display of distance remaining to the appropriate fix.
- a depiction of x-track error form the final approach course.
- LNAV capability during the missed approach procedure.

If you are vectored inside the fix from which the centerline was extended, re-extend the centerline from the next fix ahead.

Do not extend the centerline for approach when LNAV is engagled and cleared to fly a transition to the approach or if cleared from holding at a fix that is part of the approach.

Delayed Flap Approach

If the approach is not being conducted in adverse conditions that would make it difficult to achieve a stabilized approach, the final flap selection may be delayed to conserve fuel or to accommodate speed requests by air traffic. At 2500 feet AGL or Glide Slope intercept, whichever is later, select gear down, flaps 20 and select speed for flaps 20. Approaching 1300 ft AGL, select landing flaps, set the final approach speed and complete landing check list.

Flap Extension Schedule

Current Flap Position	At Speedtape "Display"	Select Flaps	Command Speed for Selected Flaps
UP	"UP"	1	"1"
1	"1"	5	"5"
5	"5"	20	"20"
20	20	25 or 30	(VREF 25 or VREF 30) + wind additives

Stabilized approach :

All approaches should be stabilized by 1000 feet above airport elevation in instrument meteorological (IMC) and by 500 feet above airport elevation in visual meteorological (VMC). An approach is considered stabilized when all of the following criteria are met.

- The aircraft is on the correct flight path
- Only small changes in heading / pitch are required to maintain the correct flight path
- The aircraft speed is not more than VREF+20 Knots indicated airspeed and not less than VREF
- The aircraft is in the correct landing configuration
- Sink rate is no greater than 1,000 fpm; if an approach requires a sink rate of greater than 1000 fpm, a special briefing should be conducted.
- Thrust setting is appropriate for the aircraft configuration
- All briefings and checklists have been conducted.

Specific types of approaches are stabilized if they also fulfill the following:

- ILS approaches should be flown within one dot of the glide slope and localizer, or within the expanded localizer scale.
- During a circling approach wings should be level on final when the airplane reaches 300 feet AGL.

Unique approach procedures or abnormal conditions requiring a deviation from the above elements requires an immediate go-around.

Note: An approach that becomes unstabilized below 1000 feet above airport elevation in IMC or below 500 feet above airport elevation in VMC requires an immediate go-around.

These conditions should be maintained throughout the rest of the approach for it to be considered a stabilized approach. If the above criteria cannot be established and maintained at and below 500 feet AGL, initiate a Go-around.

At 100 feet HAT for all visual approaches, the airplane should be positioned so the flight deck is within and tracking to remain within, the lateral confines of the runway edges extended.

As the aircraft crosses the runway threshold it should be :

- Stabilized on target airspeed to within +10 knots until arresting descent rate at flare
- On a stabilized flight path using normal maneuvering
- Positioned to make a normal landing in the touch down zone (the first 3,000 feet or first third of the runway, whichever is less).

Initiate a go-around if the above criteria cannot be maintained.

When maneuvering below 500 feet, be cautious of the following:

- Descent rate change to acquire glide path
- Lateral displacement from the runway centerline
- Tailwind/cross wind components
- Runway length available.

Mandatory Missed Approach :

On all instrument approaches, where suitable visual referene has not been established and maintained, execute an immediate missed approach when

- A navigation radio or flight instrument failure occurs which affects the ability to safely complete the approach.
- The navigation instruments show significant disagreement.
- On ILS final approach and either the localizer or the glideslope indicator shows full deflection.
- On an RNP based approach and an alert message indicates that ANP exceeds RNP.
- On a radar approach and radio communication is lost.

DG DDG

Check load sheet has DG accounted for, if signed for . Before signing load sheet: confirm GD & all PAX on board except when load sheet prepared by an agency other than Air India. Cross check T/O fuel and burn off tally. Copy details on T/O data card as read by the Capt. Also copy location of dangerous goods, if any, applicable emergency drill and UN/ID #.

Inform IFS / CIC of DG location and applicable DG drill. The UN-ID # & location must be readily known as it helps in fire fighting procedures. In case of numerous DG, it is advisable to keep NOTOC handy.
*In case of live stock being carried set the **Cargo Temp Select** Switch to high.*

Items which are ascertained as dangerous goods are given a UN No. Items newly identified as dangerous goods are given an ID No.

Be familiar with Wt & Balance/manual Load & Trim sheet.
Sign the load/trim sheet before signing the A/C acceptance.

In case of any MEL release it must be mentioned in the sector report by the PIC as "DDG NOTED".

Before signing acceptance from AME: confirm type of fuel on board (Fuel freeze temp.) & Fuel receipt on board.
Fuel already on board [at last shut-down available with AME/ next Pg of sector report] + fuel uplifted [receipt] = reqd fuel in tanks [CALC] = TOTALISER.
Chk balance & fuel uplift satisfactory.
To find the specific gravity / qty of uplifted fuel on the center CDU Sel: Menu > CMC > EICAS maintenance. Fuel quantity. Select display. After checking return to menu on CDU & clear the lower CRT by selection on EICAS panel. Various systems are available through this method.

Note : This specific gravity is an average of the fuel on board and the fuel uplifted.

Check STATUS page for any msgs affecting dispatch of Flt.

<u>ELECTRICAL POWER UP</u>: In case of a dark cockpit use the Supplementary procedure for Electrical PowerUP in FCOM Vol.1.

CAPTAIN OR FIRST OFFICER
The following procedure is accomplished to permit safe application of electrical power. **Note :** Clearance from AME (including clearance to start APU) required before commencement of the procedure. BATTERY switch..ON C1 and C2 PRIMARY pump switches ....OFF DEMAND pump selectors ....OFF WIPER selectors...OFF Landing gear lever ....DN ALTERNATE FLAPS selector..OFF Electrical power ....Establish BUS TIE switches – AUTO If external power is desired : PRIMARY EXTERNAL POWER AVAIL light – Illuminated PRIMARY EXTERNAL POWER switch - Push If the SECONDARY EXTERNAL POWER AVAIL light is illuminated: SECONDARY EXTERNAL POWER switch - Push If APU power is desired : APU GENERATOR switch - ON APU selector - START, then ON

If Ext Power or APU Gen is available both crew select adequate cockpit lighting & Speaker ON with Company frequency selected.

Check the Brake Temperature, Check the Flight Report for Snag information/MEL release/ all electronic Data Base Validity i.e. FMS, EFB, etc. & fuel on board. Calculate the estimated fuel uplift. Check previous sector Pilots report (for consequential delay)

At outstations, check the Jeppesen manual for required charts / their exact count as indexed.

Standard documents required on board.

Certificates of Airworthiness	Weight Schedule
Registration	Emergency Eqpt. Location diagram
Flight Release	Cabin Log
Insurance	Flight Report

Place CFPL (Computerized Flight Plan), Passenger announcements, Comm. sheets, Jeppessen charts, Normal checklists & QRH, Enroute charts and T.O. Data Card at the appropriate places.

Do not keep any item on the center pedestal at any time. (Ensure that nothing is served by the cabin crew over the center pedestal - the CM1 & CM2 must be served from the LHS & RHS respectively).

Any abnormality observed should be brought to the notice of the Captain & with his consent, be entered in the Flight Report for rectification.

The MEL/DDG **cannot** be applied by the crew. Once the aircraft is moving on its own thrust, the decision to return to the Bay or continue remains as the Captain's decision depending upon the failure & phase of flight. Stipulations of the MEL **preamble** must be clearly understood and applied. It is highlighted that an MEL release is only effective, when signed for by an AME.

FLIGHT DECK DOOR PROCEDURES:

The door latch system incorporates a pressure rate sensor that unlocks the door in the event of the flight deck depressurization. The Flt deck access system (guarded) switch located to the right of the flight deck door inside the cockpit, controls power supply to the door access system. The switch is in 'NORM' position before flight and is selected 'OFF' after shutdown.
The flight deck door lock selector has 3 positions:-
UNLOCK- when held in unlock position, door is unlocked.
AUTO- door locked. If emer access code entered via keypad, door unlocks after 30 secs.
DENY- rejects entry request. Prevents emergency access code entry for 5 mins.
The lock fail light illuminates when the door lock has failed or the sys is OFF. The AUTO unlock light flashes amber with a continuous chime if emer access is activated.

Normal access: -
The cabin crew / authorised persons will request access to the Flt deck by the interphone using the allotted codeword.
Cabin crew -- press '1' and 'STAR' key on the Flt deck access panel, wait for a green light on the keypad and then open door with a firm push.
Flt deck:- when the double chime sounds, rotate selector to unlock and hold till door is pushed open.
If identification of person seeking entry is suspect immediately move selector to ' DENY'. Use viewer on the door to visually identify person-seeking entry.
In case of cockpit electronic door locking system is unserviceable use the procedure laid down in Operations Manual Part A, Chapter 17.

FLIGHT DESPATCH:

Check - circulars, pigeonhole. Fill - Customs Dec, Immigration (*In Bombay sign on Immigration form in the presence of the immigration officer*), reporting time.

F/O checks - A/C doc bags as per list – interim file – Jepp. Manuals for charts & last date of revision. Revised every Monday– at Bombay
Briefing:
A/C, APU – serviceability status.

Ensure wipers, Wx Radar, Reversers, Antiskid, Autobrakes, GPWS, TCAS, Transponder, ENG/Wing Anti ice are operational during monsoons i.e. From 1st June to 15th Sept while operating in Indian Airspace/ forecast rain.

CFPL (Computerized Flight Plan): Copy reporting time in Z(UTC), Chk gate # / Bay # & co-ordinates, fuel on board.
Check- ATC Flt plan / CTOT (calculated take off time)- slot time / ADC/ FIC / SR #/ Co. RTE ID for Dest & ALTN / Routing / confirm FL for ALTN in Sec. Plan / Mark changes in FL, W.V., Temperature. Secondary flight plan made for lower level is at LRC, other SEC plans with further ALTNs are at higher flight level.
Check CFPL (Computerized Flight Plan) for pg. # / Rc # and pg. EET. Different CP's can be worked out such as for a medical emergency – normal perf., for loss of cabin Pr. - perf at low Alt., for loss of engine - perf with drift down & one engine inop.
Check overflying permission # & validity in case of charter ops/ special sectors.

A CFPL (Computerized Flight Plan) could also be in error. Check for obvious errors e.g. A basic- time/ Dist. & burn off check would help.
Weather for Dep / Dep ALTN / Enroute ALTN / Enroute / Dest / Dest ALTN - alternates & minima (s) applicable for filing as alternate.
Latest and valid TAFORs must be available. Consider validity of Wx forecasts for – the entire duration of the flight - arrival time in case of QTA, T/O forecast for ETD, Latest METAR for short sectors.

NOTAMS for departure - Dep ALTN – Enroute - Enroute ALTN - Dest - Dest ALTN.
(FIR & terminal): airspace - airfield closure / VIP movt/ congestion, peak hrs / routing change / Nav aids / APP Lts. / Security/ Co. Advisories / Fuel policy / next sector MRF if ETK.

FLIGHT PLAN AND OPERATIONAL REQUIREMENT:

The crew will check,

- Company Flight Plan in respect to routing/altitudes/flight time & fuel required/ATC flight plan and ensure that it is filed according to the prescribed procedures and agrees with the fuel flight plan routing(CFPL (Computerized Flight Plan))/the estimated load figures & reconfirm the max possible take-off & landing weights.

- Fuel Requirements:

  Check fuel advisory for the sector(s) to be operated.

  Fuel for Taxi :-

All Indian / Middle East / SE Asia	:	1000 Kgs
UK & Europe	:	1500 Kgs.
US & Canada	:	2000 Kgs.

  In case of long taxi requirement excess fuel may be considered at the consumption rate of :-

B777-200 / 200ER	:	26 Kgs/min.
B777-200LR / 300 ER	:	33 Kgs/min.

  In most cases a computer derived flight plan will be utilized to obtain the correct fuel requirements; despite the fact that these flight plans are normally accurate, it is still important to check them for gross errors. Both Captain and First Officer should verify that the fuel calculations are correct and the figure complies with the applicable fuel policy of the airline.

  Weight analysis / Final fuel / Endurance / Fuel remaining over destination / Delta factor / Minimum fuel required for diversion should all be written on the CFPL (Computerized Flight Plan) at the appropriate place.

Main tanks must be scheduled to be full if center tank fuel is loaded.

Note :-

The center tank may contain up to 1360 kilograms of fuel with less than full main tanks provided center tank fuel weight plus actual zero fuel weight does not exceed the maximum zero fuel weight, and center of gravity limits are observed.

The use of JP-4 and Jet B fuels is prohibited.

The maximum tank fuel temperature is 49° C.

Tank fuel temperature prior to takeoff must not be less than -40 degrees C or 3 degrees C above the fuel freezing point, whichever is higher.

- Fuel Transportation: The policy regarding "tankering" of fuel on sectors where a favourable fuel price differential or operational requirement exists must be checked and uplifted only if PAYLOAD permits. Remember the effect of carrying unnecessary extra fuel is to increase the fuel consumed for that sector and, therefore, effects the economy of the operation, (Increases- tyre & brake wear, climb phase duration, lowers optimum flight level & assumed temperature etc). Constraints involved in fuel tankering as per fuel policy in use should be known.
- Optimum flight level: Choice of Flight Level should be as near the optimum as possible. To obtain the optimum Flight Level use FMS cruise page. It is recommended to stay within ±2000 ft of the Optimum Altitude in order to maintain within 3% max. (depending upon the a/c variant concerned) of the optimum performance level. If flight 4000 ft below optimum is contemplated, an increase of about 7% max (depending upon a/c variant concerned) can be expected in trip fuel. OPT FL is also the best FL for Turbulence penetration.

Altitude capability for the Wt. must be ensured and the optimum and maximum altitude checked.

It is recommended that both CAPT and F/O calculate the take-off data separately and compare them rather than the F/O doing so and the CAPT acknowledging it. These should be compared with details worked out by the Despatcher.

An intersection T.O may be planned for saving in taxi time if minimum TODA = 1000' + FAR field length. Air-India RTOW tables for intersection departures take this stipulation into account.

Ensure Flight Plan checked, all papers completed, Endurance on Flight Plan. This completes the dispatch briefing.

The flight documents are now kept by the F/O. A total of 12: CREW LIST / Wx charts / TAFORS / NOTAMS / WT.ANALYSIS / FUEL CARD / FLT PLANS (as the number of crew) / NEXT SECTOR ATC PLAN / T.O. DATA CARD(S) / PILOT ANN(S) / Flight Details Card for Cabin Crew.

FUEL CONSERVATION MEASURES (PILOT TECHNIQUE):

Fuel efficiency can also be achieved by adopting efficient flying techniques, in addition to the above fuel conservation measures. Considerable savings can be achieved if flight crew adopt all of the following fuel saving measures:

i) Efficient engine start up: Delay engine startup, in case of anticipated delays.

ii) Efficient Taxy speed: Ideally the entire taxying from brake release to line-up should be done without use of thrust above idle. However occasionally, due to an upslope, slight increase in thrust may be required to initiate taxy. Efficient taxying of an aircraft is an art by itself.

Large by-pass engines have sufficient thrust to taxy the aircraft at idle thrust at most weights. Do not advance the thrust levers immediately after releasing brakes. Wait for approx. 5 to 10 sec. If the aircraft still does not move, nudge the thrust levers slightly forward and wait for a few seconds till the aircraft starts moving and taxy speed is gradually increased. Taxy speed should be allowed to increase slowly upto approx. 20 kts without increasing thrust and then reduced to approx. 10 kts by smooth and continuous brake application. On long straight taxiways and daytime flights, taxy speeds upto a maximum of 30 kts are acceptable. Sharp turns should be commenced with a maximum of 10 kts and completed with a speed of approx. 6 to 8 kts to ensure passenger comfort. It must be remembered that often the cabin crew are moving about during taxy, attending to passengers. High speed turns are very uncomfortable, especially to passengersand crew in the rear cabin area. Ideally the passengers should not hear any change in engine noise or jerky movements during taxy.

iii) Departure runway selection for direction of flight: It is preferable to use the runway in the direction of the flight to avoid longer departures, whenever possible.

iv) Speed control: Use of Cost Index based ECON speeds for c1imb/ cruise/ descent. During Radar vector approach below

10000'/ 250 kts, FL change mode to be used. VIS mode may be used when specific rate of descent is required.

v) Use of Auto Pilot/ Auto Throttle : Maximize the use of Auto Pilot/ Auto Throttle, as far as possible.

vi) Lateral track management: Wherever possible, direct routing to be requested to reduce fuel burn.

vii) Cruise altitude management: Fly optimized flight plan altitudes, as far as possible.

viii) Holding technique: In case of ATC holding, request for longest holding legs. Best Hold speed is given in the FMS Hold page. This speed gives the best L/D ratio i.e. least fuel consumption.
If not ATC constrained, refer to the QRH for best altitude for hold.

ix) Continuous Descent Approach: During Radar vectoring carry out Continuous Descent Approach (CDA) at all stations. Judicious speed control and clean configuration to be used to avoid leveling out during descent.

x) Wind forecast should be inserted in the FMS for cruise & descent.

xi) Additional fuel uplifts: It has been experienced that almost 99% of the times, the contingency fuel is not used during the flight. When actual take-off weights are lower than planned, additional fuel (considering delta factor) is also available.

In case of anticipated holding delays at the destination, the additional fuel requirements can be estimated based on the endurance time of:
a) Contingency fuel;

b) Delta fuel when actual take-off weights are less than planned take-off weights.

c) Re-designating closer alternates.

In case of any doubt in fuel planning, enter reserve as contingency + hold + ALTN + Additional. In case of 'INSUFFICIENT FUEL' msg appears, investigate the cause by checking: Distance to destination, any flight plan discontinuity, Correct step climbs inserted, insertion of wind velocity & temperatures and Track & distance. If no such msg displayed change the reserve fuel to hold + ALTN. X-check EET, Altitude capability, FOD (FOD on FMS > by the APP fuel as RWY for Dest is not selected yet & by the taxi fuel.). The flying time may be x-checked with the CFPL (Computerized Flight Plan) as the FMS calculates the ETA on PROG. Pg. 1 / 3. Current UTC time + flying time, i.e. ETA on FMS less present time = EET. This also confirms correct w/v & step climb insertions.

GOOD TO DO:

EFIS/EICAS

1. Include EICAS alert message list in the panel scan.
2. Cancel EICAS messages after corrective action and concurrence of other crew member.
3. Stay in / return to the MAP mode on the ND.
4. Display the next waypoint on the ND. unless lower range required for Wx avoidance/ TFC/ Terrain monitoring.
5. Update heading cursor to current heading.

FMS-CDU

Before load sheet is signed PF & display “PERF INIT” page. Prior to ENG start both pilots Sel T/O REF page. After both engines are started PM (Pilot Monitoring) selects “ LEGS” page.
After T/O checklist PF selects VNAV page.
Arrange waypoints on the LEGS page in the sequence of clearance. □□□□□ means : where do you want to go next ?
Check route modifications on RTE/LEGS page & ND , concur with other crew member before executing call “LNAV – Available / Armed / Captured” .
When you select any FMS - CDU page, read the 'TITLE' at the top of the page. If it is not the page you want check the prompts at the bottom of the page.
Pos error can be detected by selecting EFIS POS Sw & comparing FMC position against raw data radial & DME.
To clear the LEGS page: take the last waypoint you don't want and place it over the first waypoint you don't want; then, delete the last remaining unwanted waypoint.
In active hold, one pilots' CDU should remain on hold page.
Incase of enroute radar vectors [HDG Sel], select PROG 2/3 to monitor x-Trk error as this helps in situational awareness. i.e.: LNAV & LEGS pg. go together. HDG Sel & PROG Pg 2/3 go together. Situational awareness is improved by selecting an appropriate range at all times on the ND.

GENERAL CONDITIONS FOR PUSHBACK

- Should the Captain want the A/c stopped for any reason such as ATC requirement, loss of electrical power etc., he shall advise the ground personnel on intercom to stop. Pilot shall not use the brakes for stopping during push back. Ground personnel are responsible for aircraft speed, direction control and obstacle clearance during tow/ pushback.

- No power / hydraulic condition shall be altered during pushback.
- Nose wheel steering control must not be activated during pushback.
- Flap extension/ control checks etc must not be carried out during pushback.

SIGNALS

The following signals will be used in case there is a need to re-establish communication between the cockpit and ground.

Cockpit initiated – Repeatedly switch ON and OFF the landing / taxi light and then switch OFF all landing /taxi/ turn off/ wing lights. Hold headset near the windshield (illuminated with flash light torch at night). Ground crew will acknowledge by waving headset (illuminated with flash light torch at night). They will approach aircraft only after all lights, given above are switched OFF. The aircraft shall remain stationary with parking brakes applied till all clear signal is given once again by the ground. The ground crew will approach from 45-degree angle from the nose so that they can be seen clearly from the cockpit. On completion of communication the procedure for disconnecting and hand signals will be as given above.

Ground initiated – When the ground wish to re-establish communication with the aircraft the ground crew shall attract the attention of the cockpit crew by waving the headset by day and by flashing the signal wands and illuminating the headset with

flashlight torch at night. The cockpit acknowledges by repeatedly flashing ON and OFF the landing/ taxi light and then switching OFF all landing / taxi/ turn off / wing lights. Following acknowledgement, the aircraft shall remain stationary with parking brakes applied till all clear signal is given again by ground and acknowledged, as given above.

Note: Do not taxy out unless "ALL CLEAR" is ensured. If in doubt, contact ground control on R/T for assistance.

ENGINE START WHERE NO PUSHBACK REQUIRED

In this case it must be ensured that chocks are in place and parking brakes are applied prior to engine startup.

ONE ENGINE STARTUP IN BAY

At times due to unserviceability of APU, one engine may be started in the bay. Appropriate clearances must be obtained from ATC and ground personnel. Remaining engine(s) should be started on completion of pushback to avoid stress on the tractor and tow bar.

GROUND MANEUVER CAMERA SYSTEM:

Use of the Ground Maneuver Camera System (GMCS) B777-300

The GMCS, is available, can be useful in observing areas beneath the airplane. The GMCS is designed to aid the flight crew in determining the locatin of the nose and main gear wheels prior to or during turns while taxiing and its use should be limited to this function.

Direct visual observation out the flight deck windows remains the primary means of determining when to initiate turns and verifying airplane position relative to intended taxi path. The Ground Maneuver Taxi display may be used sparingly to determine the proximity of the nose wheels and main gear to the taxi surface edge and when the main gear have cleared the inside corner of a turn.

Note : Use caution not to fixate on or be distracted by the video display at the expense of airplane control. Ensure at least one Pilot is always looking outside the airplane.

Due to the position of the tail-mounted cameras, the following normal conditions may be observed :

- The formation of contrails just behind the engines
- Venting of oil from the engines
- Large displacement rapid flaperon movement

No crew procedures or actions, except use as a reference during taxi operations, are predicted on the use of the GMCS. EICAS alert messages remain the primary means to direct the crew to the appropriate non-normal procedures. GMCS use during takeoff, approach and landing is prohibited.

TAXI

To begin taxi release brakes, increase thrust to minimum required to roll forward then reduce thrust to idle. Idle thrust is adequate for taxiing under most conditions, however, a slightly higher

thrust setting is required to begin taxiing (brake away thrust). Airplane response to thrust lever movement is slow, particularly at high gross weights therefore crew should allow time for airplane response before increasing thrust further. Excess thrust while taxiing may cause foreign objects damage as also the jet blast can cause damage to man/machine behind the aircraft..

Due to the flight deck height above the ground, the airplane may appear to be moving slower than it is and therefore the ground speed display should be used to determine actual taxi speed.

- Normal taxiing speed is approx. 20 kts. However, on long straight taxi route speed upto 30 kts is acceptable. 10 kts or less in high density terminal areas and/or slippery conditions and for turns > 30^0.
- While taxiing momentary use of idle reverse thrust may be necessary on slippery surface for airplane control. However, thrust above reverse idle is not recommended.

CAUTION: Selection of thrust reversers results in deletion of takeoff speeds in the FMS CDU.

Proper braking technique involves a steady application of the brakes to decelerate the airplane till lower speed is achieved. As the airplane accelerates, repeat the braking sequence.

Note : Riding the brakes to maintain a constant taxi speed produces more wear than proper brake application and results in higher brake temperature.

Straight ahead steering and large radius turns may be accomplished with rudder pedal steering. During turns if nose wheel “scrubbing” occurs, reduce steering angle and / or taxi speed. Avoid stopping the airplane in a turn as excessive thrust is required to start taxiing again. Differential thrust may be required at high weights during tight turns and should be used only to maintain the desired speed in the turn. On completion of the turn, center the nose wheel and allow the airplane to roll straight ahead.

During all turning maneuvers, crews should be aware of their position relative to nose and main landing gear. Pilot judgment must dictate the point of turn initiation and the amount of nose wheel tiller required for each turn.

Model	Pilot Seat Position (forward of nose gear) feet (meters)	Pilot Seat Position (forward of main gear) feet (meters)
B777-200 ER/LR	12 (3.7)	97 (29.6)
B777-300 ER	12 (3.7)	114 (34.8)

Turns less than 90 degrees

Steer the nose wheel far enough beyond the centerline (centerline along the pilot's shoulder, approximately) of the turn to keep the main gear close to the centerline.

Turns of 90 degrees or more

Initiate the turn as the centerline approaches the aft edge of the number 2 window using approximately full nose wheel steering tiller displacement. Progressively reduce the tiller input as the airplane turns to keep the nose wheels outside of the taxiway centerline, near the outside radius of the turn. Nearing completion of turn release the tiller input as the airplane lines up with the centerline / taxiway.

Turns of 180 degrees

Taxi the airplane so that the main gear tires are close to the runway edge. Stop the airplane completely. Hold the tiller to the maximum steering angle, release the brakes and then add thrust on the outboard engine. Maintain 5 to 10 knots during the turn to minimize turn radius (slightly lesser speed to be maintained in case of slippery or contaminated runway). Light intermittent braking on the inside main gear helps to reduce the turning

radius. As the airplane passes through 90^0 of turn, steer to place the main gear approximately on the runway centerline, thereafter gradually reduce the tiller input, as required, to align the airplane with the centerline. This method results in a low speed turn and less runway being used. Wind, slope, runway or taxiway surface conditions, and center of gravity may also affect the turning radius.

Note : Lower outboard corner of the Pilots No. 1 window is a good visual reference for the outboard side of the main gear wheels on the same side, while the lower inboard corner of the Pilot's No. 1 window is a good reference for the opposite side main gear wheels.

CAUTION :
If the available taxi surface is narrow or a non-normal/emergency situation requires a turn to be performed on a 45 meter (147.6 ft) wide runway or taxi surface, towing in co-ordination with ATC and Ground support personnel is recommended.

LOAD SHEET:
EXPLANATION OF COMPUTERIZED LOAD SHEET

Check Air India limited load sheet, “ALL WEIGHTS IN KG”.

Ref. No.	Printed heading	Definition/description
1	EDNO	Edition no. Max. Two figures
2	From	3 letter IATA code of airport of departure
3	To	3 letter IATA code of airport of first intended landing
4	Flight	Flight no.
5	A/C reg.	Aircraft registration
6	Version	Configuration code of aircraft
7	Crew	No. of crew, excluding crew travelling as passengers. Cockpit / cabin crew
8	Date	
9	Time	
10	Load in compartme nts	Total weight of dead load per compartment
11	Passenger/ cabin bag	Total Wt – PAX. + cabin baggage
12	M	Total no. Of male PAX
13	F	Total no. Of female PAX
14	C	Total no. Of children
15	I	Total no. Of infants
16	Ttl	Total no. Of PAX on board
17	Cab	Wt of cabin baggage not included in PAX Wt.
18	PAX	Total no. Of seats per class, including PAD. Max upto 3 classes

Ref. No.	Printed heading	Definition/description
19	Soc.	Seats occupied by cargo, baggage and/or mail per class
20	Blkd	Fitted seats not available for PAX. Or deadload
21	LIZFW	Loaded index at zero fuel Wt.
22	LITOW	Loaded index at T/O Wt.
23	LILAW	Loaded index at landing Wt.
24	MACZFW	Mac at zero fuel Wt. (Mean Aerodynamic Chord)
25	MACTOW	Mac at T/O Wt.
26	MACLAW	Mac at landing Wt.
27	STAB TO	Stab trim setting at T/O
28	STABLN	Stab trim setting at landing.
29	Seat row trim/ cabin area Trim	Type of trimming used in cabin area
30	Seating	No of PAX per zone
31	Under load before LMC	Difference between max and actual gross Wt indicated by L
32	Last minute changes	
33	Dest	Destination of LMC
34	Spec	Kind of LMC
35	CL/CPT	Class/compartment and/or position of unitilised load
36	+ -	Identification of ON or OFF-load
37	Weight	Weight of LMC
38	LMC total + -	Identification of LMC sum total
39	STD DOW	Standard dry operating Wt
40	STD DOI	Standard dry operating index

Ref. No.	Printed heading	Definition/description
41	TZFW/	Total ZFW to destination
42	LDM	Load distributing message
43		Flt no./date, regn. Version crew. Total ZFW to Dest – 1st destination. No of PAX to 1st Dest. Total & Compartment load to 1st Dest. PAX per class to 1st Dest. PAX available for Disembarkation. Codes for cargo requiring special attention. See Attached list for more details 2nd destination. No of PAX to 2nd Dest. Total & compartment load to 2nd Dest. PAX per class to 2nd Dest. PAX available for disembarkation. Codes for Cargo requiring special attention. See attached list for more details.

Code	Description	Format
Aog	Spare parts required for A/C on gnd 1-3 alpha-numerics to indicate the loading position. Eg. Aog/1 .aog/a aog/12l	.aog/m(m) (m)
Avi	Live animals 1-3 alpha-numerics to indicate the loading position. Eg.: Avi/4 . Avi/cl	.avi/m(m) (m)
Bal	Ballast hold loaded (unmanifested). 1-3 alpha-numerics to indicate the loading position followed by an oblique and 2-4 numerics to indicate the weight. Eg.: .bal/1/75 .bal/4/1000	.bal/m(m) (m)/ff(f) (f)
Bed	Stretcher installed (unmanifested). 1 or 2 numerics to indicate the total number of seats blocked by the stretcher arrangement(s) followed by an oblique and 1 or 2 numerics plus 1 alpha character to indicate the number of passengers (invalid and accompanying) and class, travelling on these seats. These passengers must be included in the pax fy distribution. Eg.: .bed/6/3y	.bed/m(m) (m)/ff
Beh	Stretcher hold loaded (unmanifested). 1-3 alpha-numerics to indicate the loading position followed by an oblique and two numerics for the weight of the stretcher. Eg.: .beh//34l/50	.beh/m(m) (m)/ff

Code	Description	Format
Big	An item loaded on two or more pallets or which, due to its size or weight, requires special handling//equipment for loading and OFF-loading. 1-3 alpha-numerics to indicate the forward position and 1-3 alpha-numerics to indicate the rear position of the pallet bays over which the piece is loaded, followed by an oblique and 2-5 numerics to indicate its weight in kilograms. Eg.- .big/11p12p/1567	.big/m(m) (m)m(m) (m)/ff(f) (f) (f)
Cao	Dangerous goods cargo aircraft only (labeled). 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-4 numerics to indicate the weight. Eg.- .cao/a/58	.cao/m(m) (m)/f(f) (f) (f)
CAT	Cargo attendant on cargo aircraft. 1 or 2 numerics to indicate the number. Eg.- .CAT/2	.CAT/f(f)
Com	Company mail (unmanifested). 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-4 numerics to indicate the weight. Eg.- .com/1/16 .com/12p/216	.com/m(m) (m)/f (f) (f) (f)
Csu	Catering equipment and food supply not used on flight (unmanifested) 1-3 alpha-numerics to indicate the loading position followed by an oblique and 2-4 numerics to indicate the weight. Eg- .csu/32r/1100	.csu/m(m) (m)/ff(f) (f)

Code	Description	Format
Dhc	Crew positioning to/from duty not directly involved in the operation of the flight, who are occupying passenger seats. Eg - .dhc/0/2/16	.dhc/f (f) (f)/f(f) (f)(/f(f) (f))
Dip	Diplomatic mail. 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-2 numerics to indicate the number of bags. Eg.: .dip/4/2 .dip/32l/4	.dip/m(m) (m)/f(f)
Code	Description	Format
Eat	Foodstuffs for human consumption other than meat and fish/seafood as specific handling codes are designated for such codes. 1-3 alpha-numerics to indicate the loading position. Eg.: .eat/2	.eat/m(m) (m)
Eld	Extra load device. 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-4 numerics to indicate the weight. Eg.: .eld/32/l425	.eld/m(m) (m)/f(f) (f) (f)
Eic	Equipment in compartment (unmanifested). 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-4 numerics to indicate the weight. Eg.: .eic/4/50 Miscellaneous items not included in the dry operating weight/index but not including bal, bed, com, csu, fkt and beh.	.eic/m(m) (m)/f(f) (f) (f)
Fil	Undeveloped film/unexposed film. 1-3 alpha-numerics to indicate the loading position. Eg.: .fil/3	.fil/m(m) (m)

Code	Description	Format
Fkt	Flight kit (unmanifested). 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-4 numerics to indicate the weight(not applicable when weight is included in the dy operating weight/index.) Eg.: .fkt/54/450	.fkt/m(m) (m)/f(f) (f) (f)
Hea	Heavy cargo above 150 kg per piece. 1-3 alpha-numerics to indicate the loading position followed by an oblique and 3-4 numerics to indicate the weight. Eg.: Hea/1/196	.hea/m(m) (m)/fff(f)
Heg	Hatching eggs. 1-3 alpha-numerics to indicate the loading position. Eg.: Heg/21l	.heg/m(m) (m)
Hum	Human remains in coffins. 1-3 alpha-numerics to indicate the loading position followed by an oblique and 2-3 numerics to indicate the weight. Eg.: .hum/4/258	.hum/m(m) (m)/ff(f)
Ice	Carbon dioxide, solid (dry ice) (shipment) (labeled). 1-3 alpha-numbers to indicate the loading position. Eg.: .ice/11r	.ice/m(m) (m)
Lho	Live human organs/blood 1-3 alpha-numerics to indicate the loading position. Eg.: .lho/2	.lho/m(m) (m)
Mag	Magnetized materials (labeled)	Not to be used on load sheet and load message.
Mos	Miscellaneous operational staff other than crew, who perform functions relating to the flight and occupy passenger seats. Eg.: .mos/0/0/2	.mos/f(f) (f)/f(f) (f) (/f(f) (f))

Code	Description	Format
Nil	No items loaded or manifested.	.nil
Obx	Obnoxious dead load that produces strong offensive odour. 1-3 alpha-numerics to indicate the loading position. Eg.: Obx/22p	.obx/m(m) (m)
Code	Description	Format
Ohg	An item loaded on one or more pallets that overhangs positions other than those on which it is loaded. An item loaded on one or more pallets that overhangs positions other than those on which it is loaded, 1-3 alpha-numerics to indicate the forward position and 1-3 alpha-numerics to indicate the rear position of the pallet bays on which the items loaded, followed by an oblique, 1-3 alpha-numerics to indicate the position of the pallet Bay overhung by the load and 1-3 numerics to indicate the length of the overhang in centimeters. The overhang information is to be repeated, if required. Eg.: .ohg/ef/g100 .ohg/dr/cr100/er80	.ohg/m(m) (m)m(m) (m)/m(m) (m) f(f) (f)r
Pad	Passengers not entitled to a firm booking who may be offloaded at a station en route to their ticketed destination in order to accommodate joining passengers who have higher priority. Eg.: .pad/2/1 .pad/0/1/5	.pad/f(f) (f)/f(f) (f) (/f(f) (f))

Code	Description	Format
Pea	Hunting trophies, skin, hide and all articles made from or containing parts of species listed in the cites 1-3 alpha-numerics to indicate the loading position. Eg.: .pea/2	
Pef	Flowers. 1-3 alpha-numerics to indicate the loading position. Eg.:.pef/5	.pef/m(m) (m)
Pem	Meat. 1-3 alpha-numerics to indicate the loading position. Eg.: .pem/5 .pem/11p	.pem/m(m) (m)
Pep	Fruits and vegetables. 1-3 alpha-numerics to indicate the loading position. Eg.: .pep/3	.pep/m(m) (m)
Per	All perishable cargoes other than flowers, meat and fish/seafood as individual handling codes are designated for such codes. 1-3 alpha-numerics to indicate the loading position. Eg.:.per/2 .per/31l	.per/m(m) (m)
Pes	Seafood/fish for human consumption. 1-3 alpha-numerics to indicate the loading position. Eg.: .pes/5	.pes/m(m) (m)
Rcl	Cryogenic liquids (refrigerated liquefied gases). 1-3 alpha-numerics to indicate the loading position. Eg.: .rcl/5	.rcl/m(m) (m)
Rcm	Corrosive (labeled). 1-3 alpha-numerics to indicate the loading position. Eg.: Rcm/2	.rcm/m(m) (m)
Rcx	Explosive 1.3c (labeled). 1-3 alpha-numerics to indicate the loading position. Eg.: Rcx/cr	.rcx/m(m) (m)

Code	Description	Format
Rex	Normally forbidden explosive(1.1, 1.2, 1.3 (with a few exception), 1, 4f, 1.5 and 1.6(labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: Rex/a	.rex/m(m) (m)
Rfg	Flammable gas (labeled). 1-3 alpha-numerics to indicate the loading position. Eg.: Rfg/21	.rfg/m (m) (m)
Rfl	Flammable liquid (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rfl/b	.rfl/m(m) (m)
Rfs	Flammable solid (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rfs/2	.rfs/m(m) (m)
Rfw	Dangerous when wet (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rfw/21p	.rfw/m(m) (m)
Rgx	Explosive 1.3g (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: Rgx/FL	.rgx/m(m) (m)
Ris	Infectious substance(labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .ris/22	.ris/m(m) (m)
Rmd	Miscellaneous dangerous Goods (labeled)	Not to be used on load-sheet and load message
Rng	Non-flammable non-toxic gas (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rng/31	.rng/m (m) (m)
Rop	Organic peroxide (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rop/2	.rop/m(m) (m_
Rox	Oxidizer (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rox/2	.rox/m(m) (m)

Code	**Description**	**Format**
Rpb	Toxic (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rpb/2	.rpb/m(m) (m)
Rpg	Toxic gas (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rpg/a	.rpg/m(m) (m)
Rrw	Radioactive category 1 – while (labeled)	Not to be used on load-sheet and load message
Rry	Radioactive categories ii & iii – yellow (labeled) 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-3 numerics to indicate the sum of transport indexes. If decimals are shown this must be separated by the abbreviation "pt". Eg.: .rry/1/6pt4 .rry/d/25	.rry/m(m) (m)/f (f) (f)
Rsb	Polymeric beads(labeled) 1-3 alpha-numerics to indicate the loading position followed by an oblique and 1-3 numerics to indicate the weight in kilograms. Eg.: Rsb/23l/95	.rsb/m(m) (m)/f(f) (f)
Rsc	Spontaneously combustible (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rsc/12	.rsc/m(m) (m)
Rxb	Explosive 1.4b (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rxb/b	.rxb/m(m) (m)
Code	Description	Format
Rxc	Explosive 1.4c (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: Rxc/13	.rxc/m (m) (m)
Rxd	Explosive 1.4d (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rxd/3	.rxd/m(m) (m)

Code	Description	Format
Rxe	Explosive 1.4e (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: Rxe/22r	.rxe/m(m) (m)
Rxg	Explosive 1.4g (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rxg/1	.rxg/m(m) (m)
Rxs	Explosive 1.4s (labeled) 1-3 alpha-numerics to indicate the loading position. Eg.: .rxs/FL	.rxs/m(m) (m)
Soc	Seats occupied by baggage, cargo and/or mail. 1-3 numerics to indicate the number of seats occupied in each class separated by an oblique. Eg.: .soc/11/32 .soc/0/140 .soc/32/44	.soc/f(f) (f)/f(f) (f) (/f (f) (f))
Val	Valuable cargo	Not to be used on load sheet load message
Wet	Shipments of wet materials not packed in watertight containers, e.g. Fish packed in wet ice. 1-3 alpha-numerics to indicate the loading position. Eg.: .wet/52	.wet/m(m) (m)
Xcr	Operating crew requiring passenger seat(s) 1-3 numerics to indicate the number of seats occupied in each class separated by an oblique. Eg.: .xcr/2/0/3	.xcr/f(f) (f)/f(f) (f) (/f(f) (f))
Xps	Priority small package 1-3 alpha-numerics to indicate the loading position. Eg.: Xps/47r	.xps/m(m) (m)

Unusable Seats in the Cabin:

If a seat is snagged, after the passengers have boarded, an alternate seat should be offered. The next station should be informed by Traffic, not to allot that seat, Engg. should endeavour to rectify the snag and the Cabin Log should reflect the snag.

Carriage of Dry Ice – Fwd cargo – Max 567 Kgs. Aft/Bulk cargo – Max 612 Kgs. Total in A/c – Max 952 Kgs.
Individuals –2 kgs per person.
Dividing the Dry Ice equally in the cargo compartments will minimize CO2 gas concentration. At least one pack ON if A/C on ground for more than One hour. Do not carry livestock in the same compartment as Dry Ice.

PARKING BRAKE:

If EICAS BTMS unit is 2 or less. ‘0’ is preferable)

PROCEEDING TO THE AIRCRAFT:

Copy of the Immigration clearance is retained by the crew duly stamped & signed at BOM. Immigration forms are not required to be filled for a domestic flight & no clearance is required. The 2nd and 3rd copy of the customs declaration is retained by the crew after clearance, one of which is kept by each crewmember. The custom's officer retains the 1st & 4th copy. All copies are duly stamped & signed. The crew have to retain their copies for clearance after landing at an Indian station.

REFUELING:

Refueling in transit/ crew change station requires 2 exits to be available such as 2 step ladders or 2 jetties or 1 step ladder and 1 jetty and communication between IFS / CIC/ AME established with announcement made by IFS / CIC to PAX, to refrain from smoking. Refuelling should be avoided in strong electric storms. When the cockpit crew boards, contact with the AME should be established.

As a security measure the cockpit door must be kept Locked at all times and entry be permitted to authorised personnel only, on need basis; with prior identification. Introductions by cabin crew in flight are not permitted.

RAMP INSPECTION FOR COCKPIT & CABIN CREW :

All the flight crewmembers must co-operate with the DGCA / foreign civil aviation officials during ramp inspection.
Valid- licenses, medical, card issued by training division, giving recency of Special Ops / GTR, FS, DG / PPC. PPC/IR, R/C / CRM / CAT II/III, Logbook & recency (as applicable), Air India & BCAS identity card, two pairs of spectacles, torches, vailable & updated Jeppesen manuals, A/C Documents & licences (Originals placed in a metal box in FWD Suitcase stowage space near CM1 seat).
Flight planning: latest weather / flight plan / NOTAMS / L & T sheet / trim balance in case of manual load sheet / T/O performance calculation / jeppesen charts handy / dispatch flight release.

Cockpit crew:

Pre-flight / exterior walk around / emergency review / cockpit set up / crew baggage stowage / reference to MEL / placarding / DDG usage / co-ordination with other members (cabin & ground crew)

Cabin crew pre-flight:

Inspection of emergency equipment / escape slide / bottle pressure/ Portable 0_2 & fire extinguisher bottle masks & pressure / serviceability check of megaphone / stowage and certification of first aid kits & physicians kit i.e. Knowledge of its location & use.
Cabin set up / passenger handling in clearing the aisle / positioning at vantage points for evacuation / PAX Hand baggage stowage (identifying the extra large baggage – not to be kept in cabin). Exit row seating - Briefing.
Galleys restraint tie down / trash receptacle for closing of lid.
Circuit breakers for operation & Location / water stowage / quantity / water shut OFF valves for location and operation
Floor to be safe / galley carts / food trolley for stowage / demo video – operation & quality / demo kit / Paper work / entry in cabin log and review of previous entry.

Security:

Identifying foreign objects & unclaimed baggage.

Ramp insp. can also be carried out by foreign regulatory agencies. The inspector can - enter the A/C and / or facilities related to its operations or maintenance – inspect the A/C, the A/C logbooks, other docs and / or any other materials related thereto and / or question any person, concerned with the A/C or its operational safety.

In case any significant discrepancy directly affecting operation safety is found, inspectors will require the personnel (s) and /or organisation(s) concerned to take appropriate corrective actions prior to further flights in accordance with the applicable provisions.

Checklist

Operations items	Maintenance items.
Competence certificate / CA-35 medical Cert / assessment A/C Flt. Logbook, AFM C of A, Radio License, Air Operator's Permit, MEL, DDG, Cabin safety / Emergency proc hand book. Required equip in cockpit / cabin Markings including emergency pass Lts, etc. PAX emplaning / deplaning Dangerous goods Regulations A/C marshalling and towing procedures.	A/C Flt. Logbook Discrepancy status concerning A/C and appliances Certificate and other docs necessary for A/C Ops A/C exterior condition Reqd equip in cockpit / cabin Cargo container Fueling De-icing / Anti-icing.

For info only: A tie down strap is provided to secure the flight kit; this must be used. In case of obese PAX, seat belt extension is avail at the fwd coat compartment.

REMOTE DISPATCH:

The remote dispatcher analyses and sends FLT release msg. / NOTAM's, TAFORs, METARs and En-route wx for dep, dep altns, dest(s) and destns(s) alternates / Comm listing / Plotting Chart / Copy of filed & accepted ATC flight plan (with CTOT if any) / Any Route clearance(s) (as applicable).

The Flight Plan is generated with the EZFW given by stations concerned.

In case payload permitting /ETK sector into BOM, the Flight Plan is limited to landed fuel requirement as prescribed in the Operations Manual – Part A, Chapter 12. The RTOW(L) is calculated based on Max. Ldg. Wt + Burn off.

Note : Taxi fuel is not part of burn off**.**

The departure station :- Collects the Met folder from local Met office, ensures that all the TAFORs as per the list provided are avail in the folder. Collects all documents as sent by Despatch. Confirms that Flight Plan pages are correct as per Flight release message. Ensures copies of Flight Plan are as many as number of operating crew + one extra on which signature of Commander is taken on the office copy.

Commercial staff is not reqd to brief nor are they qualified to brief on any operational matter. They are not reqd to maintain any technical manuals or books. They will provide ZFW, Bay, handover papers, collect fuel figures from crew and relay to load controller.

Crew shall: Fill up crew reporting time form. *Check Remote dispatch msg, ATC Flt plan, Wx, NOTAMS. Decide fuel. Make T/O data card and leave a signed copy of the CFPL (Computerized Flight Plan) at the departure station. docs, calculate RTOW, prepare T/O data card, fill up Commanders/Air Hostess announcement sheets.*

In case of any MEL/DDG requirements involving performance corrections, the same must be applied and a snag telex sent to

down line stations and Mumbai. Fresh Flight Plan(s) may be obtained from dispatch, if reqd.

Carry to A/C:

ATC Flt plan / NOTAMS / Wx forecasts / fuel card [in pocket (bowser stby)]/ Wt analysis sheet / 2 T/O data cards / 2 CFPL (Computerized Flight Plan)s / Crew list / customs dec & immigration form, as applicable.

The cabin crew introductions must be carried out prior to commencing the flight and IFS / CIC be briefed about specific instructions as required for the flight; such as cockpit entry proc including normal entry and hijack code (e.g. Rose, etc), location of DGs, instructions on CAT-A DIP Mail, forecast WX/CAT affecting cabin service etc.

Sign crew list prior to security check at Bom. Sign crew list & Log crew-boarding time on A/C at Bom. [Min 30 min before ETD]

STERILE COCKPIT

Sterile Cockpit during flight, Cockpit Entry procedures and Seat Belt Sign operation (Sterile Cockpit)

Cabin crew entry into cockpit and non adherence to company's sterile cockpit policy by the crewmembers during critical stages of flight (Taxy, Take-off, Climb, Descent, Approach, & Landing), during changing state phases of flight and whilst flying thru high density traffic environment/airspace conditions, distracts the Cockpit Crew. As such during these crucial stages of flights there is an increased workload on the Cockpit Crew and they are required to be more alert, watchful and situationally aware, any distraction at these stages could thus lead to an unintentional errors/violations.
With cognizance to above and in view of flight safety recommendations, Cabin crew entry into the cockpit and Seat Belt Sign operation is as described below :-

A. Seat Belt Sign operation & Cabin/Galley Secured confirmation:
a) During Taxy, Take off and Climb:
*1. Cabin Crew shall complete securing galley/cabin for Take-off **during the initial stages of Taxy.** IFS/CIC shall ensure that the Pax Cabin Safety Demonstration is completed, cabin/galley's are secured and **confirm the same to the Cockpit Crew well in time to avoid distraction just before Take off,** by suitable means depending upon the type of aircraft.*

*2. **Cockpit Crew shall give "Cabin Crew to Take-Off stations" call prior to take off, well in advance,** so as to give sufficient time to cabin crew to complete their tasks/before take-off checks and settle in positions. (Short taxy time and expeditious take offs must be anticipated).*

*3. **Passing 10000' AGL Seat Belt Sign shall be cycled twice** (double chime). This is to indicate to cabin crew that A/C is passing 10,000'.*
- Use of Electronic Equipment permitted

*4. **Seat Belt sign shall be kept ON until passing 20000' AGL.** (Captain may however keep the Sign ON until a later stage, if required, due weather /turbulence). Cabin Crew shall make suitable **Pax announcement once the Seat Belt sign is switched OFF.***

b) During Descent , Approach & Landing:

*1. **10 mins prior to commencement of descent,** Captain shall **inform the IFS/CIC of impending descent** and shall provide necessary airfield information if available. Whereby Cabin crew shall begin their descent preparation.*

*2. **Seat Belt Sign shall be selected ON At 20000' AGL.** (Captain may however select the Sign ON at an earlier stage, if required, due weather /turbulence). Cabin Crew shall make **suitable announcement for landing at 10,000'.** IFS/CIC shall ensure that cabin/galleys are secured for landing and **confirm the same to Flight Crew at the earliest** by suitable means.*

*3. **Passing 10000' AGL the Seat Belt Sign shall be cycled twice (Double Chime).** This is to indicate to the Cabin Crew that A/C is passing 10,000'. IFS/CIC shall make the appropriate announcement.*

1. *Below 10.000', oxygen is not a criticality*
2. *Cabin crew announcement for landing/use of Electronic Equipment.*

*4. **Cockpit Crew shall give "Cabin Crew Landing stations" call with the selection of first Flaps for approach,** so as to give sufficient time to cabin crew to complete their final landing checks if any and settle in their positions.*

Note:

*i) Any airport specific requirements for seat belt operation during climb and decent e.g. at Delhi **shall be catered for.***

*ii) In case of prolonged holding for landing, **Seat Belt Sign***

may be switched OFF (weather permitting) above 10,000' to facilitate passengers. *In such cases to alert the Cabin Crew, an announcement such as* ***"Cabin Crew we expect to land in 10 mins etc."*** *should be made when finally cleared for the approach.*
iii) The existing practice of ***Seat Belt Sign operation*** *and associated Pax announcements during anticipated weather conditions and flying thru area of CAT remains unchanged.*

B. Cabin Crew entry into cockpit & guarding the Cockpit Door:
1. In view of the prevailing security threats and otherwise high alert situations, it is once again retreated that ***cockpit door must be kept closed & locked at all times during flight.*** *Cabin Crew should be suitably briefed bout the* ***cockpit entry procedures and the warning code*** *in case of unlawful interference etc.*

2. Cockpit Crew should avoid calling the Cabin Crew into cockpit ***during climb until reaching TOC, similarly from To D until landing.*** *Sterile cockpit shall be maintained during the crucial phases of flight and flying thru high density traffic environment/airspace conditions.*

3. IFS/CIC shall ensure Cabin crew does not enter the cockpit unless ***specifically called by the Cockpit Crew or for reporting any operational urgent/emergency matters.*** *Any Cabin crew shall not hesitate to immediately report urgent safety related information to the cockpit. However, administrative matters should be routed through IFS / CIC. Activities such as signing of flight reports, custom / immigration declaration forms etc must be completed before commencing descent or on completion of flight.*

4. Cockpit crew ***should not divert their attention to respond to IFS/CIC/Crew attending the Cockpit call, they shall respond only when not pre occupied with operational tasks or not engaged with ATC conversation.*** *Attending crewmember will maintain silence unless responded by the Cockpit crew and shall always lock/close the door upon entering/exiting the cockpit.*

5. Whenever a Cabin Crew is entering the Cockpit with a tray, etc., ***another crew shall accompany and guard the cockpit door.*** *Similarly whenever any of the cockpit crew members leaves the cockpit for using the toilet etc. one* ***cabin crew shall be positioned to guard passage and cockpit door, to ensure no unauthorized person follows the crew and forcibly enters the cockpit,*** *as the cockpit is most vulnerable from unauthorized entry at this stage.*

6. IFS/CIC shall ensure that necessary airfield information required for Pax announcement is sought well in advance and ***operational requirements*** *such as Wheel chairs / High lifts / Ambulances etc.* ***are conveyed to the Cockpit crew before commencement of descent to avoid disruption to them during descent.***

C. General observance by crew (Sterile cockpit):

1. During Taxy/Take-off/ Climb / Descent & Landing phases of flight, ***windshields should not be covered with screens/shades/visors, etc. to afford a clear view of traffic and avoid distractions.*** *Use of any cap having a peak and appropriate sun glasses to avoid glare from the sun during such crucial phases of flight* ***is recommenced.*** *During Cruise covering the windshields by means other than the screens/shades/visors provided by the manufacturer is not permitted.*

2. ***Headsets should be worn*** *from Preflight/Before Start Checklist up to stabilized Cruise, and from Before Descent Checklist till Secure Cockpit Checklist.*

3. As far as possible meeting the ***Cabin Crew for Introduction and Preflight briefing*** *by Captain* ***should be completed at Flight Despatch or on ground, otherwise on board the aircraft before Passenger enplanement.*** *Cabin Crew introductions during the course of flight should be avoided.*

4. ***During the Preflight briefing to Cabin Crew,*** *expected en-route weather/anticipated CAT areas and its probable*

duration must also be covered, to help Cabin Crew in planning the meal service accordingly and to avoid disruption in the service whilst flying thru such conditions.

5. *Passengers and crew must be kept informed at all times of any impending delays. Necessary in flight Pax announcements must be made. In case of* ***inordinate delay for take off and prolong holdings for landing a suitable announcement must be made.***

6. Cabin crew ***shall pay attention to all Cockpit announcements*** *made during the course of flight. IFS/CIC shall ensure suitable Pax announcements are made accordingly as enumerated above, also whenever the* ***Seat Belt sign is selected ON or OFF*** *during Climb, Cruise (Turbulent weather conditions), Descent, Approach & Landing.*

7. Filling up of the Flight Plan and other paper work (Pilot Report, Flight Report, any other Reports, etc.) shall only be carried out during stable cruise or on ground. ***No paperwork to be carried out during climb descent, approach or during changing state phases of flight.***

8. ***Cockpit Crew to ensure that the above procedures are covered during their Pre-Flight briefing to Cabin Crew.*** *Cabin Crew have been made aware of the above procedural amendments and its compliance, a suitable circulars to this effect is issued by IFSD. IFS/CIC shall carry the copy of the amended Cockpit Entry/Exit and standard Operating Procedure circular at all times.*

SEAT BELT SIGN USAGE FOR DEL:

1. *If Departure is from DEL, seatbelt 'ON' sign shall be maintained until crossing 50 nautical miles or FL 150 whichever is later.*

2. *Keep the selector in 'ON' position if Wx/Turb is expected during climb.*

Note : Arriving into Delhi while crossing 50 nautical miles or FL 150 whichever is earlier, the seatbelt sign will be selected 'ON' and maintained till engine shutdown.

SYNOPTIC DISPLAY:
USE OF SYNOPTIC DISPLAY:

Synoptic displays should be used as necessary to get desired information and then turned OFF. Except for fuel quantity indications crew procedures and actions are not dependent on use of synoptic displays.

TAKE-OFF:
STANDARD INSTRUCTIONS FOR TAKE-OFF:

The PM is also expected to monitor the Engine / Flight instruments, make standard calls and announce significant deviations if any during the take off roll.

When the Capt performs the T/O briefing, the phrase "STD INSTRUCTIONS" therein means:

a) Any crew member noticing a malfunction / abnormality must announce the same clearly and precisely & the PM silences any aural warning by pushing the caution / warning light push button.

b) Depending upon the abnormality and the airspeed at that moment, the Capt decides either to continue the T/O **or** to reject the T/O by simultaneously announcing his intention as "GO" or "STOP" respectively.

c) The decision to reject and the execution of a reject is vested with the Capt. The captain initiates stopping actions for all RTOs. The only exception being incapacitation of the captain.

In case the Capt is the PM; the absence of standard calls could also mean incapacitation of the captain. As such, all the required actions must be accomplished by the PF. In case of an engine failure the PF will feel the loss of engine thrust (yaw) earlier than the PM; and if the call "STOP/ V1/ GO" has not been made by the captain, in this case, the PF should initiate the stopping actions. It is emphasized, if the Captain is not incapacitated, then he must be situationally aware so as to make the standard calls and avoid a situation where a co-pilot carries out a critically complex task with PIC taking no actions, when only 1 sec may be available to carryout the complete task correctly.

In case the takeoff is being performed by a PIC under supervision or the first officer, the PIC under supervision or the first officer must remove his hand from the thrust levers after the TOGA Switch is pushed. The Captain then

places his hand on the thrust levers. This is done so as to enable the captain to discontinue / reject the T/O without delay.

At heavy weights the A/C accelerates at 3 to 6 knots per second and the critical engine failure during perf calculations is considered to have taken place at Vef i.e. 1 sec. Prior to V1 & not at V1.(T/o safety trng aid 2.15)
The term V1 in this manual is the speed at which V1 is announced.

Emphasis is on the fact that V1 is an action speed. V1 is a speed latest by which the deceleration should have been initiated i.e. the thrust should be at idle & RTO braking action initiated latest by V1.
If T/O is rejected & if AUTO BRK caution msg appears on EICAS, & / or lack of aggressive deceleration experienced, then Max. Manual braking must be used.
If the failure has not been recognized at V1 the decision will be to continue the T/O, unless the A/C is not-airworthy.

If the Capt. Calls "STOP" remember :

- The other crew member on hearing the call "STOP" **AND** followed by a positive control input by the Capt towards achieving a stop, must then remove his hand(s) & feet from the control column / (thrust levers) and the rudder pedals immediately and revert to the duties of the PM.
- The call "STOP" by the Capt implies 'I have controls' (i.e. The Capt has controls)
- The Capt is now the PF and has control of the A/C.
- While announcing "STOP" the Capt takes over control & simultaneously initiates the stopping action.
- The stop maneuver at Field Length Ltd. Wts is critical at speeds approaching V1.
- The call V1 has precedence over any other call.

If the Capt. Calls "GO", remember :

- The PF continues the T/O. If the Capt. decides to take over the controls of the A/C he does so after announcing "I HAVE CONTROL".
- The other CM simultaneously states "YOU HAVE CONTROL" & must remove his hand & feet from all controls immediately and revert to the duties of a PM.
- The call V1 has precedence over any other call.
- Ensure a minimum height of 50 ft has been achieved and positive climb is indicated when the gear is selected up. The radio altimeter read out helps monitoring height.
- Check A/C in trim and stabilized flight path before selecting A/P (Min ht 200 ft).
- Select / set max THR. as per Capt's command. One engine inoperative safety climb speed is V2.
- All actions on Capt.'s command.
- No non – normal recall procedure or check list should be initiated till the A/C has attained a min height of 400 ft. AGL and flight path is stabilised.
- Critical / irreversible action like Fuel Control Sw. CUT OFF or pulling of FIRE Sw. must only be done with consent of the Capt.
- TOGA thrust if used on live engines, should not be used for more than 10 mts.

TAKEOFF CROSSWIND GUIDELINES

CROSS WIND LANDING

Limitations for Cross-wind component is as follows :

Runway condition	
Take-off and landing :	
DRY runway	25 kts
WET runway	20 kts
1. Slush/wet snow/ice covered runway 2. Landing in CAT I or lower minima	15 kts
SLIPPERY runway * (see note below)	10 kts

Very restrictive

Note : Braking coefficient 0 to 0.29 = POOR
Braking coefficient 0.30to 0.39 = MEDIUM
Braking coefficient 0.40 and above = GOOD

Landing with Braking action poor is not permitted except in emergency

TAIL WIND – Any runway condition – 10 kts

Note : The maximum demonstrated takeoff and landing cross wind is 38 knots

Automatic landing : # Maximum allowable wind speeds when landing weather minima are predicated on autoland operations:

Head wind	25 Knots
Tailwind	10 Knots
Cross wind	25 knots

WIND SPEED (Kts)			
ANGLE	**15**	**25**	**40**
10	86	>100	>100
20	43	73	>100
30	30	50	80
40	23	38	62
50	19	32	52
60	17	28	46
70	16	26	42
80	15	25	40
90	15	25	40

Directional Control

Initial runway alignment and smooth symmetrical thrust application result in good crosswind control capability during takeoff. Light forward pressure on the control column during the initial phase of takeoff roll (below approximately 80 knots) increases nose wheel steering effectiveness. Any deviation from the centerline during thrust application should be countered with immediate smooth and positive control inputs. Smooth rudder control inputs combined with small control wheel inputs result in a normal takeoff with no over controlling. Large control wheel inputs can have an adverse effect on directional control near V1 (MCG) due to the additional drag of the extended spoilers.

Note : With wet or slippery runway conditions, the PM should give special attention to ensuring the engines have symmetrically balanced thrust indications.

Rotation and Takeoff

Maintain wings level during the takeoff roll by applying control wheel displacement into the wind. During rotation continue to apply control wheel in the displaced position to keep the wings level during liftoff. The airplane is in a sideslip with crossed controls at this point. A slow, smooth recovery from this sideslip is accomplished after liftoff by slowly neutralizing the control wheel and rudder pedals.

Gusty Wind and Strong Crosswind Conditions

For takeoff in gusty or strong crosswind conditions, use of a higher thrust setting than the minimum required is recommended. When the prevailing wind is at or near 90^0 to the runway, the possibility of wind shifts resulting in gusty tailwind components during rotation or liftoff increases. During this condition, consider the use of thrust settings close to or at maximum takeoff thrust. The use of a higher takeoff thrust setting reduces the required runway length and minimizes the airplane exposure to gusty conditions during rotation, liftoff and initial climb.

Avoid rotation during a gust. If a gust is experienced near VR, as indicated by stagnant airspeed or rapid airspeed acceleration, momentarily delay rotation. This slight delay allows the airplane additional time to accelerate through the gust and the resulting additional airspeed improves the tail clearance margin. Do not rotate early or use a higher than normal rotation rate in an attempt to clear the ground and reduce the gust effect because this reduces tail clearance margins. Limit control wheel input to that required to keep the wings level. Use of excessive control wheel may cause spoilers to rise which has the effect of reducing tail clearance. All of these factors provide maximum energy to accelerate through gusts while maintaining tail clearance margins at liftoff. The airplane is in a sideslip with crossed controls at this point. A slow, smooth recovery from this sideslip is accomplished after liftoff by slowly neutralizing the control wheel and rudder pedals.

TAXI:
EXTRACTS FROM FAA AC NO: 120-74 DTD 18.06.2002

1. Focus

This guidance focuses on the activities occurring within the cockpit (e.g. Planning communicating coordinating), as opposed to the actual control of the aircraft (e.g., Steering, maneuvering). Taxi operations present distinct challenges and requirements not found in other phases of flight operations. These distinct challenges are elaborated, when necessary, throughout the guidance. A section is also included in the use of exterior aircraft lights during ground operations, which make aircraft more conspicuous to other flight crew.

2. Flight crew procedures

The potential for runway incidents and accidents can be reduced through adequate planning, coordination, and communication. The following guidelines are intended to help flight crew cope more effectively during taxi operations. The guidelines are grouped into 6 major categories :

i) Planning

through planning for taxi operations is essential for a safe operations. Planning should be done in two main phases. First, anticipate airport surface movements by doing pre-taxi or pre-landing planning based on information on the ATIS and previous experience at the airport second, once taxi instructions are received, the pre-landing or pre-taxi plans should be reviewed and updated as necessary. It is essential that the updated plan be understood by all flight crewmembers.

Remember to review the latest NOTAMS for both the departure and arrival airports for information concerning construction and/or taxiway/runway closures. Check the expected taxi route against the airport diagram or taxi

chart. Pay special attention to any unique or complex intersections along the taxi route. While planning for departure, be sure to consider the likely inbound taxi route at the arrival airport as well. Flight crew should identify critical times and locations on the taxi route (transitioning through complex intersections, crossing intervening runways, entering and lining up on the runway for takeoff, and approaching and lining up on the runway for landing) where verbal coordination between the PIC and the sic will be important to ensure correct aircraft Navigation and crew orientation.

The timings and execution of aircraft checklist and company communications should be at appropriate times and locations so the pilot who is not taxiing the aircraft can be available to participate in verbal coordination with the pilot who is taxiing the aircraft, to confirm compliance with ATC taxi instructions at the appropriate time and locations. When planning these tasks, flight crews should also consider the anticipated duration of the taxi operation, locations of complex intersections and visibility along the taxi route. If possible, during low visibility, flight crew should only conduct pre-departure checklists when the aircraft is stopped.

ii) Situational awareness

The flight crew should know the aircraft's precise location on the airport, particularly at unfamiliar airport, where the airport layout and taxi routes are complex, or the visibility is poor.
Flight crew should actively monitor and update their progress and location during taxi. This includes knowing the aircraft's present location and mentally calculating the next location on the route that will require increased attention, e.g. A turn onto another taxiway, an intersecting runway, or any other transition points. Relevant information should be verbally shared with each other.
Monitoring ATC instructions/clearances issued to other aircraft enhances situational awareness

Prior to entering or crossing any runway, scan the full length of the runway, including approach areas. Verbally confirm scan results with each other and aircraft should be stopped if there is any difference or confusion about the scan results.

Caution*: Do not stop on a runway. If possible, taxi off the runway and then initiate communications with ATC to regain orientation.*

Be especially vigilant when instructed to taxi into position and hold, particularly at night or during period of reduced visibility. Do not remain in position and hold on the departure runway for an extended period without direct communication from ATC. If uncertain about any ATC instruction or clearance, query ATC immediately. If anyone suspects radio problems and weather conditions permit, attempt to observe the tower for light gun signals.

Use extra caution when directed to use a runway as a taxiway, especially during reduced visibility conditions.
Use the utmost caution after landing on a runway that intersects another runway or on a runway where the exit taxiway will shortly intersect another runway.

Caution :
After landing, when you are on an exit taxiway that is between parallel runways, taxi your aircraft clear of the landing runway, unless you are constrained by a hold short line associated with the adjacent parallel runway.
Unless otherwise instructed by ATC, taxi clear of the landing runway even if it required crossing or entering a taxiway/ ramp area.
At an airport with an operating air traffic control tower, never enter a runway without specific authorization. When in doubt, contact ATC.
At a non-towered airport or at an airport where the control tower is closed, listen on the appropriate frequency (CTAF) for inbound aircraft information and scan the full length or the runway, including the final

approach and departure paths, before entering or crossing the runway.

After landing and exiting the runway, nonessential communications and nonessential flight crew actions should not be initiated until clear (on the inbound side) of all runways in accordance with sterile cockpit procedures.

iii) Use of written taxi instructions

Writing down taxi instructions, especially complex instructions can reduce a pilot's vulnerability to forgetting part of a complex instruction.

Note: while written taxi instructions are a good operating technique, common sense and flexibility should be used in determining the crew's need for them at a specific airport. For example, if the departure runway is very near the aircraft parking location, or if the crew has used the same taxi route numerous times in the previous days, it may only be necessary to record the basic elements of the taxi clearance. However, where the taxi instructions are complex or the crew is unfamiliar, with the airport layout, a verbatim transcription of all instruction is desirable. Additionally, individual pilots may chose to develop a set or symbols and shorthand notations which allow them to clearly record and later recall key items in the taxi instructions.

iv) Intra-flight deck/cockpit verbal coordination

It is essential that the flight crew correctly understands and agrees on all ATC ground movement instructions. Any misunderstanding or disagreement should be resolved to the satisfaction of all flight crewmembers before taxiing the aircraft. It is the verbal aspect of this coordination that is most significant. It is not enough to assume that all flight crewmembers have heard and understood instructions correctly. A common understanding can be enhanced by one flight crewmember repeating the instructions verbally and getting agreement on the content and intent from the other flight crewmembers(s). Any persistent disagreement or uncertainty among crewmembers should be resolved by contacting ATC for clarification.

1) *When ATC issues taxi instructions for a departure, the flight crew should refer to the airport diagram, coordinate verbally, and agree on the assigned runway and taxi route, including any instructions to hold short of or cross an intersecting runway.*
2) *When ATC issues landing instructions, the flight crew should coordinate verbally and agree on the runway assigned by ATC, as well as any restrictions, such as hold short points of an intersecting runway after landing.*
3) *After landing and exiting the runway, the flight crew should coordinate verbally and agree on the ATC taxi instructions to the aircraft's parking Area, including any instructions to hold short of or cross an intersecting runway.*
4) *At complex intersections, the flight crew should verbally coordinate to be sure that the intersection is correctly identified and that the aircraft is transitioning through the intersection to the correct taxiway.*
5) *When approaching an intersecting runway, the flight crew should verbally coordinate in order to identify the runway. They should also verbally review the ATC instructions as to whether they are to hold short or cross the runway.*
6) *Before crossing any runway or entering a runway for takeoff or for landing, both pilots should visually scan to the full length of the runway and its approach paths, and coordinate verbally that the scan area is or is not clear.*
7) *Before entering a runway for takeoff, the flight crew should verbally coordinate to ensure correct identification of the runway and receipt of the proper ATC clearance to use it. Similar verification should be performed during approach to landing.*
8) *When it becomes necessary for a flight crewmember to stop monitoring any ATC frequency, he or she should tell the other flight Crewmember(s) when stopping and resuming the monitoring of a the ATC frequency. Any instructions or information received or Transmitted during the flight crewmember's*

absence from the ATC frequency should be briefed and reviewed upon his or her return.

9) *When the pilot not taxiing the aircraft focuses his or her attention on instruments in the cockpit, such as entering data into the aircraft's flight management system, and consequently is not able to visually monitor the aircraft's progress, he or she should verbally notify the pilot taxiing the aircraft. Likewise, notification should be made when the flight crewmember has completed his or her task and is again able to visually monitor the taxi operation.*

v) ATC/flight crew communication

The primary way the flight crew and ATC communicate is by voice. Controllers use standard phraseology and require readback and other responses from the flight crew in order to ensure that clearances and instructions are understood. The flight crew can help enhance the controller's understanding by responding appropriately and using standard phraseology. The AIP, approved flight crewmembers training programs and operations manuals provide information for flight crew on standard ATC phraseology and communications requirements. Some of the most important guidelines that contribute to clear and accurate communications are included here.

Maintain a "sterile" cockpit. Flight crewmembers must be able to focus on their duties without being distracted by non-flight related matters.

Use standard ATC phraseology at all times in order to facilitate clear and concise ATC/flight crew communications.

Focus on what ATC is instructing. Do not perform any non-essential tasks while communicating with ATC.

Read back all hold short and runway crossing instructions and clearances, including the runway designator. Note : air traffic controllers are required to obtain from the pilot a read back of all runways hold short instructions.

Read back all T/O and landing clearances, including the runway designator.

Clarify any misunderstanding or confusion concerning ATC instructions or clearances.

vi) Taxiing

1) *Prior to taxiing a copy of the airport diagram should be available for use by the flight crew.*
   Note: a flight crewmember, other than the pilot taxiing the aircraft, should normally follow the aircraft's progress on the airport diagram to ensure that instructions received from ATC are being followed by the pilot taxiing the aircraft.
2) *The aircraft's compass or heading display is an excellent tool, as a supplement to visual orientation for confirming correct taxiway or runway alignment. Refer to it as frequently as necessary, but especially at complex intersections and where the takeoff ends of two runways are close to one another.*
3) *Low visibility conditions incase the challenge of safely moving the aircraft on the airport surface. Although visibility is technically designated as "low" when the RVR falls below 500m, visibility along the taxi route may be considerably less than the runway visibility. Use all resources available, including heading indicators, airport signs, markings and lighting and airport diagrams to the fullest extent possible in order to keep the aircraft on its assigned taxi route.*
4) *Anytime the flight crew becomes uncertain as to the aircraft's location on the airport movement area, stop the aircraft and immediately advise ATC. If necessary, request progressive taxi instruction. The flight crew should give ATC any information available about their position, such as signs, markings, and landmarks.*
   Caution: do not stop on a runway. If possible, taxi OFF the runway and then initiate communications with ATC to regain orientation.
5) *When cleared to takeoff, or to cross a runway, or when exiting a runway, do so in a timely & prompt manner. Inform ATC of any anticipated delay.*
6) *After landing, do not exit onto another runway without ATC authorization.*

3) *Use of exterior aircraft lights to make aircraft more conspicuous.*

A) General

1) Exterior aircraft lights may be used to make an aircraft operating on the airport surface more conspicuous. Pilots may use various combinations of exterior lights to convey their location and intent to other pilots. Certain exterior lights may also be used in various combinations to signal whether the aircraft is on a taxiway or on a runway, in position on the runway but holding for takeoff clearance, crossing an active runway, or moving down the runway for takeoff.

2) Flight crew are cautioned not to rely solely on the status of an aircraft's lights to determine the intentions of the flight crew of the other aircraft. Additionally, flight crew must remember to comply with operating limitations on the aircraft's lighting systems.

B) Exterior lights

To the extent possible and consistent with aircraft equipage, operating limitations and flight crew procedures, illuminate exterior light as follows:-

i) Engines running – turn on the rotating beacon whenever an engine is running.

ii) Taxiing – prior to commencing taxi, turn on Navigation, Anti-collision and logo lights. Strobe lights should not be illuminated during taxi if they will adversely affect the vision of other pilots or ground personnel.

iii) Crossing a runway – all exterior lights should be illuminated when crossing a runway.

iv) Entering the departure runway for takeoff. When entering a runway to takeoff, or when taxiing into position and holding for takeoff, illuminate one or more landing lights and all other exterior lights. Strobe lights should not be illuminated if they will adversely affect the vision of other pilots.

v) Takeoff- turn on all remaining landing lights when takeoff clearance is received, or when commencing takeoff roll at an airport without an operating control tower.

4. Summary

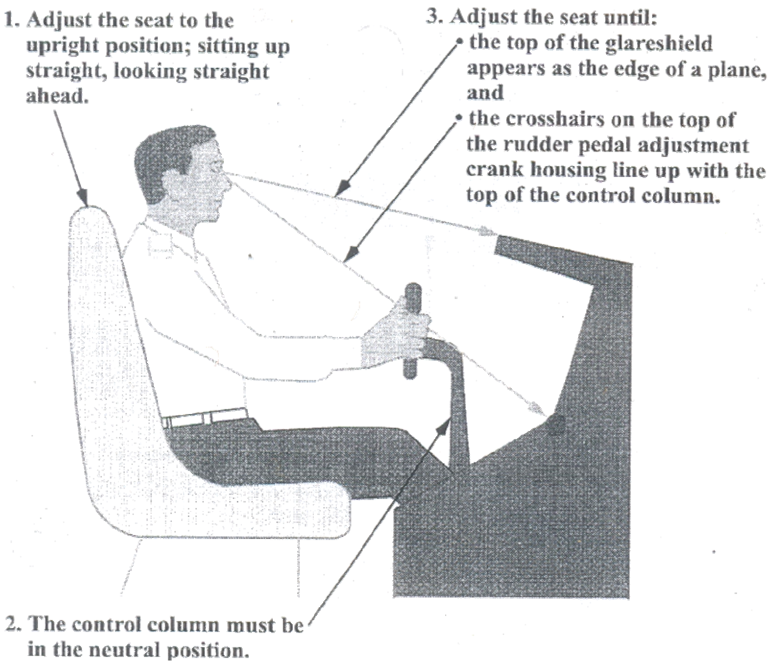
Taxi operations require constant vigilance on the part of the entire flight crew. Each flight crewmember needs to be continually aware of the movement and location of other aircraft and ground vehicles. Taxi operations require the same planning, coordination, and proper execution as other phases of flight operations. Sterile cockpit discipline is always appropriate while taxiing even under normal weather conditions.

During low-visibility taxi operations, additional vigilance is absolutely essential. Flight crew must pay particularly close attention to instructions from ATC and must insist on correct readback and hearback. Additionally, flight crew should pay close attention to readback and hearback between ATC and other aircraft. Any ambiguity or uncertainty should be promptly resolved by clarification with ATC. When clear of an active runway, flight crew should be prepared to stop in position to resolve any questions about position on the airport or clearance from ATC.

Safe aircraft operations can be accomplished and incidents eliminated if flight crew correctly accomplish standard taxi operating procedures and practices.

TECHNIQUES

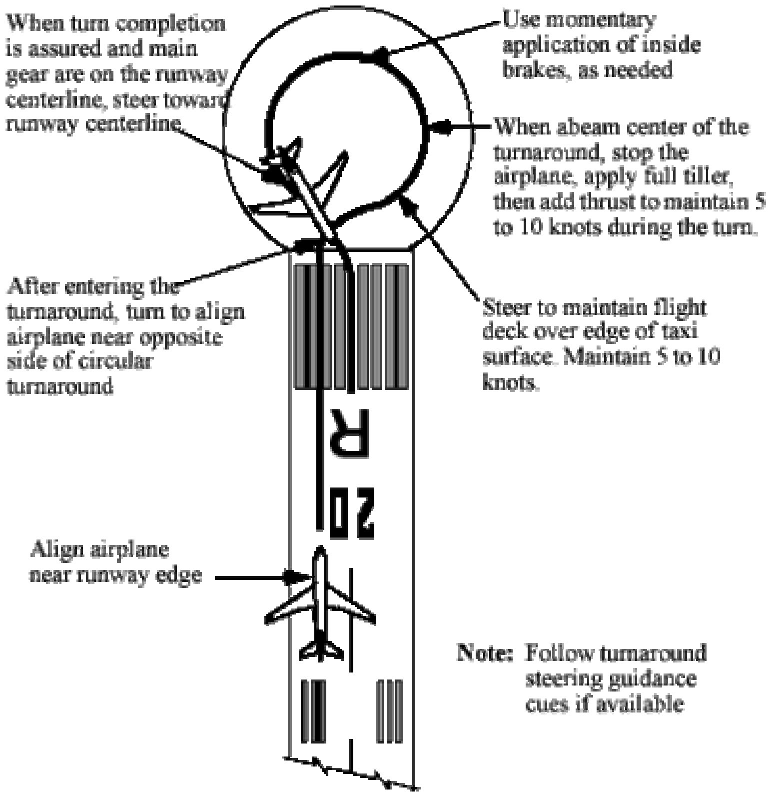
Pilot Seat Adjustment



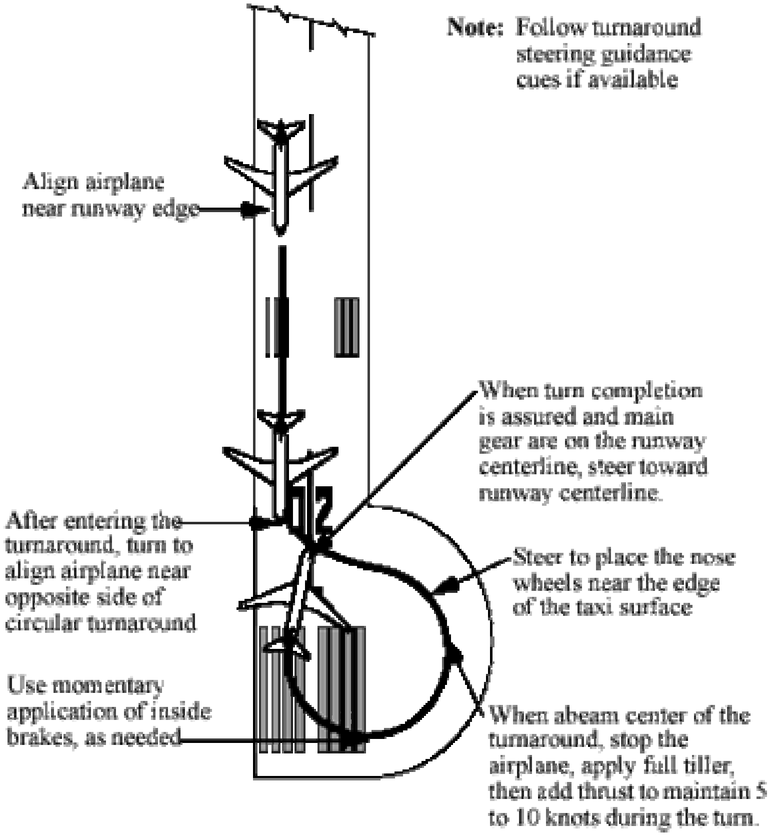
180^0 turns on runway

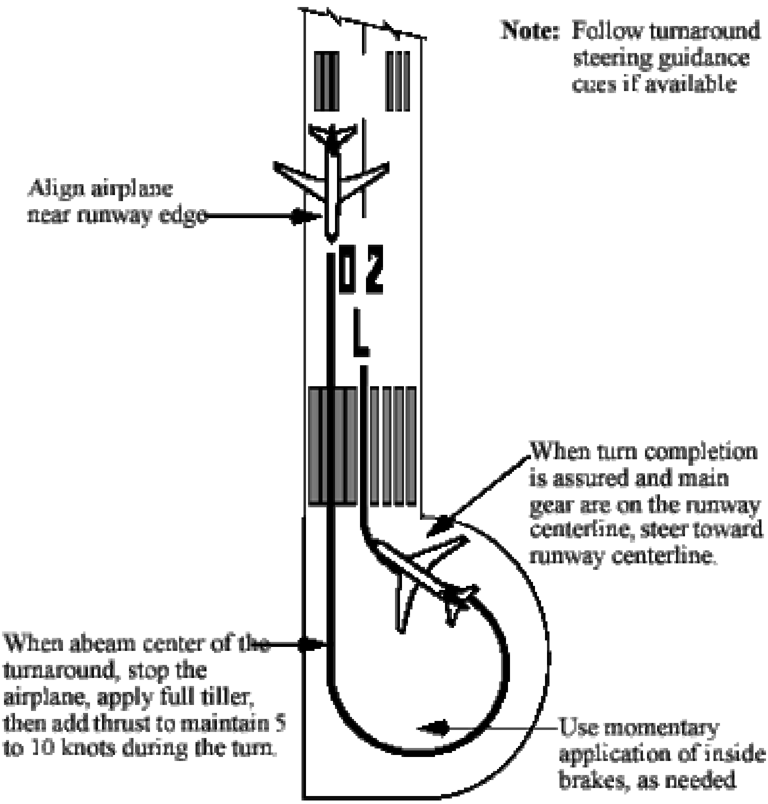
The following diagrams suggest a good technique to ensure a minimum radius during 180^0 turns on various runway turnaround configurations. These provide the best maneuver capability while ensuring the maximum runway length available for takeoff at the completion of the turn.

Circular turn around



Hammer head turn around




Note: Follow turnaround steering guidance cues if available
Align airplane near runway edge
02
L
When turn completion is assured and main gear are on the runway centerline, steer toward runway centerline.
When abeam center of the turnaround, stop the airplane, apply full tiller, then add thrust to maintain 5 to 10 knots during the turn.
Use momentary application of inside brakes, as needed

WEATHER RADAR OPERATION:

The weather radar beam width is 3°. When Wx radar tilt equals the FPA then the Wx radar beam is centered at the flight path of the aircraft.

Shorter ranges should be changed to larger ranges periodically to observe distant conditions. Assessment & Wx avoidance planning should be done at 80 NM range on the ND. shorter ranges on the ND should be used for actual weather avoidance. Clouds, fog, wind, CAT, windshear and lightning are not detected by weather radar.

The tilt required depends on the range selected and the terrain. Adjust tilt till some ground returns appear at the periphery on the ND. Storm cells should be cleared by at least
10 NM when OAT is warmer then freezing.
15 NM when OAT is cooler than freezing.
25 NM when at or above 25,000'.
Penetration or overflying by less than 5000' should not be attempted. Flying under or downwind of a thunderstorm should be avoided due to the possibility of windshear, microburst, severe turbulence or hail.

WX+T mode: displays weather returns and turbulence within areas of precipitation. Turbulence display is available with ND ranges of 40 NM or less and should be used in areas of heavy precipitation with frequent adjustments to tilt.

The vertical distance between the top of the precipitation and the aircraft FL can be calculated by the formula: Δ h(feet) = d (NM) x tilt (in degrees where the cell just reappears) x 100.
For e.g. If the precipitation top just reappears at a tilt angle of -1° at a range of 60 NMs then

$$\Delta h\ (feet) = 60 \times (-1) \times 100 = -6000'$$

At this altitude you may still pass through the cloud but clear the area of precipitation by 6000'.

Selection of TERR Sw deselects Wx radar displays though the range arcs remain displayed. EFIS selections should be such so as to display TERR on one side and Wx on the other. During daytime in VMC the Wx radar is selected at the discretion of the PIC.

<u>RVSM INDIA</u>:

In all Situations the Pilot's judgment shall determine the sequence of actions to be taken, taking into account specific circumstances.

Rapid descent and/or turn-back or diversion to an alternate airport.

If an A/C is unable to continue flight in accordance with its *ATC* clearance, a revised clearance shall, whenever possible, be obtained prior to initiating any action, using a distress or urgency signal as appropriate.

If prior clearance cannot be obtained, an ATC clearance shall be obtained at the earliest possible time and, until a revised clearance is received, the pilot shall:

if possible, deviate away from an ATS route or route system;
establish communications with and alert nearby aircraft by broadcasting, at suitable intervals : flight identification, flight level, aircraft position, (including the ATS route designator) and intentions on the frequency in use, as well as on frequency 121.5 MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45 MHz);
watch for conflicting traffic both visually and by reference to ACAS; and
turn on all aircraft exterior lights (commensurate with appropriate operating limitations)

In-flight Contingency Procedures requiring rapid descent, turn-back or diversion in the Chennai, Kolkata and Mumbai FIRs

Initial action

If unable to obtain a revised ATC clearance, the aircraft should leave its assigned route or track by turning 90 degrees right or left whenever this is possible. The direction of the turn should be determined by the position of the aircraft relative to any ATS route or track system (for example, whether the aircraft is outside, at the edge of, or within the system). Other factors to consider are terrain clearance and the levels allocated to adjacent routes as per the Flight Level Allocation Scheme (FLAS).

Subsequent action

AIRCRAFT ABLE TO MAINTAIN LEVEL : An aircraft able to maintain its assigned level should acquire and maintain in either direction a track laterally separated by 25 NM from its assigned route or track and once established on the offset track, climb or descend 500 ft(150m).

AIRCRAFT UNABLE TO MAINTAIN LEVEL : An aircraft NOT able to maintain its assigned level should, whenever possible, minimize its rate of descent while turning to acquire and maintain in either direction a track laterally separated by 25 NM from its assigned route or track. For subsequent level flight, a level should be selected which differs by 500 ft (150m) from those normally used.

DIVERSION ACROSS THE FLOW OF ADJACENT TRAFFIC : Before commencing a diversion across the flow of adjacent traffic, the aircraft should, while maintaining the 25 NM offset, expedite climb above or descent below levels where the majority of aircraft operate (e.g., to a level above FL 400 or below FL 290) and then maintain a level which differs by 500 ft (150m) from those normally used. However, if the pilot is unable or unwilling to carry out a major climb or descent, the aircraft should be flown at a level 500 ft above or below levels normally used until a new ATC clearance is obtained.

Weather Deviation Procedures in the Chennai, Delhi, Kolkata and Mumbai FIRs

If the aircraft is required to deviate from track to avoid weather and prior clearance cannot be obtained, an air traffic control clearance shall be obtained at the earliest possible time. In the meantime, the aircraft shall follow the procedures detailed below.

a) *if possible, deviate away from the ATS route or route system;*
b) *establish communication with and alert nearby aircraft by broadcasting, at suitable intervals : flight identification, flight level, aircraft position (including the ATS route designator) and intentions (including the magnitude of the deviation expected) on the frequency in use, as well as on frequency 121.5MHz (or, as a back-up, the VHF inter-pilot air-to-air frequency 123.45 MHz).*
c) *watch the conflicting traffic both visually and by reference to ACAS;*
d) *turn on all aircraft exterior lights (commensurate with appropriate operating limitations);*
e) *for deviations of less than 10NM, aircraft should remain at the level assigned by ATC;*
f) *for deviations of greater than 10NM, when the aircraft is approximately 10NM from track, initiate a level change based on the following criteria :*

Route center line track	*Deviations >10NM*	*Level change*
EAST *000-179 magnetic*	*LEFT* *RIGHT*	*DESCEND 300 ft* *CLIMB 300 ft*
WEST *180-359 magnetic*	*LEFT* *RIGHT*	*CLIMB 300 ft* *DESCEND 300 ft*

If the pilot determines that there is another aircraft at or near the same FL with which his aircraft might conflict, then the Pilot is expected to adjust the path of the aircraft, as necessary, to avoid conflict.

g) *if contact was not established prior to deviating, continue attempt to contact ATC to obtain a clearance.*

If contact was established, continue to keep ATC advised of intentions and obtain essential traffic information.

h) *when returning to track, be at its assigned flight level, when the aircraft is within approximately 10 NM of centerline.*

If in contact, the Pilot shall advise ATC when weather deviation is no longer required, or when a weather deviation has been completed and the aircraft has returned to the centerline of its cleared route.

When the Pilot initiates communications with ATC, rapid response may be obtained by stating "WEATHER DEVIATION REQUIRED" to indicate that priority is desired on the frequency and for ATC response.

The Pilot still retains the option of initiating the communications using the urgency call "PAN PAN" to alert all listening parties to a special handling condition, which may receive ATC priority for issuance of a clearance or assistance.

When controller-pilot communications are established, the pilot shall notify ATC and request clearance to deviate from track, advising, when possible, the extent of the deviation expected. ATC will take one of the following actions :

a) *if there is no conflicting traffic in the horizontal dimension, ATC will issue clearance to deviate from track; or*

b) *if there is conflicting traffic in the horizontal dimension, ATC will separate aircraft by establishing vertical separation or, if unable to establish vertical separation, ATC shall :*
   - i) *advise the pilot unable to issue clearance for requested deviation*
   - ii) *advise pilot of conflicting traffic*
   - iii) *request pilot's intentions*

SAMPLE PHRASEOLOGY : "Unable (requested deviation), traffic is (call sign, position, altitude, direction), advise intentions."

The following special procedures are applicable to mitigate wake turbulence or system alerts (e.g. ACAS, Ground Proximity Warning System (GPWS)] in airspace where RVSM is applied:

Note: In the contingency circumstances below, ATC will not issue clearances for lateral offsets and will not normally respond to actions taken by the Pilots.

An aircraft that encounters wake vortex turbulence or experiences distracting aircraft system alerts shall notify ATC and request a flight level, track or speed change to avoid the condition. However, in situations where such a change is not possible or practicable, the pilot may initiate the following temporary lateral offset procedure with the intention of returning to centerline as soon as practicable :

- *a) the pilot should establish contact with other aircraft, if possible, on the appropriate VHF inter-pilot air-to-air frequency; 123.45 MHz and*
- *b) one (or both) A/C may initiate lateral offset(s) not to exceed 2NM to the right of track, provided that:*
    - *i) as soon as practicable to do so, the offsetting aircraft notify ATC that temporary lateral offset action has been taken and specify the reason for doing so (ATC will not normally respond); and*
    - *ii) the offsetting aircraft notify ATC when re-established on assigned route(s) or track(s) (ATC will not normally respond).*

Procedures for Air-Ground Communication Failure

SELCAL or similar automatic signaling devices satisfy the requirement to maintain an air-ground voice communication watch.

If a communication failure occurs follow the communication failure procedures of Annex 10, Volume II, and the following procedures as are appropriate.

If in visual meteorological conditions, the aircraft shall :

- *a) continue to fly in visual meteorological conditions;*

b) land at the nearest suitable aerodrome; and
c) report its arrival by the most expeditious means to the appropriate air traffic control unit.

If an instrument meteorological conditions the aircraft shall :

a) maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan.
b) Proceed according to the current flight plan route to the appropriate designated navigation and serving the destination aerodrome and, when required to ensure compliance with (c) below, hold over this aid until commencement of descent;
c) Commence descent from the navigation aid specified in (b) at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at or as close as possible to, the estimated time of arrival resulting from the current flight plan;
d) Complete a normal instrument approach procedure as specified for the designated navigation aid; and
e) Land, if possible, within thirty minutes after the estimated time of arrival specified in (c) or the last acknowledged expected approach time, whichever is later.

The provision of air traffic control service to other flights operating in the airspace concerned will be based on the premise that an aircraft experiencing communication failure will comply with the above.
Guidance for Pilots & Controller for Actions in the Event of Aircraft System Malfunction or Turbulence Greater than Moderate is placed in the interim file for detailed reference.

WET / CONTAMINATED RUNWAY OPERATIONS

Any water on a runway creates a potential slippery situation and should be treated with caution. Cross-wind/ tailwind components add to the threat.

Braking Action is reported as "Good", "Medium" or "Poor" after analyzing the readings of friction measuring devices such as DBV (Diagonal Brake Vehicle), ASFT (Airport Surface Friction Tester). The British Mu meter and the "Griptester" trailer, etc. To increase friction, runway treatment is carried out. It is simply removal of rubber deposits by chemical or water blast techniques, or mechanical scrubbing.

When runway is wet or contaminated, calculate the landing distance required including the factored distances for components unserviceable, eg. Thrust reversers, spoilers, etc. If landing distance required is marginal, compared with landing distance available, then consider diversion.

DETERMINATION OF LANDING DISTANCE

Tables are provided in the QRH for DRY Runway and Slippery Runway with Braking action as Good, Medium and Poor, for normal & non-normal configuration. When the runway is wet, the slippery runway table with "good" braking action is to be entered. However, if the braking action is reported as Medium then the "Medium" table is used. In case of runway contaminated with water with no reports of braking action use Braking action "Medium". However, if the reported braking action is "poor" consider diversion except when there is no option. If diversion is not possible, then the "poor" table must be referred to.

LANDING GEOMETRY:

The tables in the QRH give the actual landing distance from the threshold assuming approximately 1000 feet of air distance,

*which is included in the tabulated distance. It is being emphasized that this caters to only 4 secs of flare to touchdown from the 30 feet point. However, the average flare time ranges from 6 secs to 8 secs and therefore, it would be prudent to add another 1000 feet to the distance extracted from the table to give a more realistic landing distance. The QRH tabulated landing distance is the distance from the landing threshold and not from "beyond glide slope", and is the actual distance covered by the aircraft from the threshold including the air (float) distance and **does not** include the Regulatory (FAA) 60% additional margin.*

When reported braking action is medium or braking action in the pilots' judgement is medium or when the R/W is soaked with water, use Auto brakes as:
'Max Auto'

In all cases monitor the deceleration rate. If it is observed to be less than the required rate of deceleration, then use maximum manual braking (i.e. full brake pedal deflection) which gives the highest deceleration rate.

Further emphasis should be placed upon the following:

- *Select appropriate auto-brake as per SOP.*
- *Approach on glide path at the correct approach down.*
- *Avoid extended flare and ensure a firm touch down.*
- *Use maximum reverse thrust as soon as possible.*
- *Confirm extension of ground spoilers.*
- *Do not delay lowering nose-wheel onto the runway. This increases weight on wheels and activates aircraft systems associated with nose gear squat switches/ proximity detectors.*
- *Monitor auto-brakes or apply pedal brakes with continuous steady pressure. Do not pump brakes or apply then release and reapply. The Anti-skid will regulate the braking most effectively if continuous pressure is maintained.*
- *For directional control use rudder pedals and differential braking. Do not use nose wheel steering tiller.*
- *At taxi speed use nose wheel steering with care.*

Finally, it is being emphasized that at any point during final approach it is felt that adequate landing distance may not be available due to changed circumstances or weather; there should be no hesitation in executing a missed approach.

Table of comparative braking states/ runway condition is given below:

BRAKING ACTION		***RUNWAY CONDITION***		
ICAO	***US***	***(CODE)***	***ICAO (MU)***	***US***
GOOD	*GOOD*	*5*	*.40 & above*	*40 & above*
GOOD – MEDIUM		*4*	*.36 - .39*	*36 - 39*
MEDIUM	*FAIR*	*3*	*.30 - .35*	*30 - 35*
MEDIUM – POOR	*--*	*2*	*.26 - .29*	*26 - 29*
POOR	*POOR*	*1*	*.21 - .25*	*21 - 25*
NIL	*NIL*	*--*	*.20 & below*	*20 & below*

Refer Operations Manual for more details on this subject.

WEIGHT ANALYSIS:
The contingency fuel is to cater for unforeseen reasons such as lower level Ops, Enroute Wx., Engine failure enroute. Contingency fuel is meant to be used, though it is a part of the FOD / FREM in the Flt Plan. (FOD = Alt + Hold + Contingency)
Secondary Flt plan - level & ALTN is calculated at LRC, for a distant ALTN.

Off loading of payload for carrying extra fuel should not be resorted to, instead consider a closer ALTN. The commercial interest of the airline must be primary; de-fueling should only be resorted to incase FOB results in off loading of payload / results in exceedence of RTOW. A flight should not be delayed for fuel uplift in case of drop in final ZFW on Eco tankering sectors (ETK); if safety is not involved.

Do not resort to off loading of revenue payload to accommodate non-revenue passengers. In special and exceptional circumstances and if found necessary to amend the directions in the foregoing, then suitable action may be taken provided full and complete justification in the PSR for that particular flight is raised. This PSR should be forwarded to the office of the Director of Ops.

Check - ETOW / Alt capability / RTOW / Landing Wt Limited (L).
If required apply the ∆ factor to – burn off / RTOW / Limiting Wt (L) / MRF / FOD / FREM / Endurance.
Fuel to be in tanks – FOB = uplift in kgs/Sp.Gr. 0.781 = fuel uplift in Lts approx.

WEIGHT ANALYSIS:
Annotate qty & reason for additional fuel uplift over & above the Flt. Plan fuel, whether at dispatch or at the A/C by stating company advisory [CAD] / delta factor [ZFW] / perf adjustment [PAD]/ Dest Wx [WXD] / farther ALTN [ALT], Eco tankering [ETK], Fuel already on board [FOB]. The uplift should commensurate with the advice.
The contingency fuel is to cater for unforeseen reasons such as lower level Ops, Enroute Wx., Engine failure enroute.

Contingency fuel is meant to be used, though it is a part of the FOD / FREM in the Flt Plan. (FOD = Alt + Hold + Contingency)
Secondary Flt plan - level & ALTN is calculated at LRC, for a further ALTN.

Off loading of payload for carrying extra fuel should not be resorted to, instead consider a closer ALTN. The commercial interest of the airline must be primary; de-fueling should only be resorted to incase FOB results in off loading of payload / results in exceedence of RTOW. A flight should not be delayed for fuel uplift in case of drop in final ZFW on Eco tankering sectors (ETK).

Ask for a new CFPL (Computerized Flight Plan) if ATOW > PBRW by 6 Tons if flt time upto 4 hrs and by 4 tons if flt time > 4 hrs.
Decide the final fuel & compare the ETOW with the CFPL (Computerized Flight Plan) Wt. Work out the Δ factor.
A) ETK into BOM B) ETK into Stations other than BOM.

Check - ETOW / Alt capability / RTOW / Landing Wt Limited (L).
If required change – burn off / RTOW / Limiting Wt (L) / MRF / FOD / FREM / Endurance.
Fuel to be in tanks – FOB = uplift in kgs/Sp.Gr. = fuel uplift in Lts approx.

Do not resort to off loading of revenue payload to accommodate non-revenue passengers. In special and exceptional circumstances and if found necessary to amend the directions in the foregoing, then suitable action may be taken provided full and complete justification in the PSR for that particular flight is raised. This PSR should be forwarded to the office of the Director of Ops.

The advantage of Flaps 5 for T/O are:	The advantage of Flaps 15 for T/O are:
1) Higher climb gradient 2) Better distant obstacle Clx margins 3) Lesser fuel burn.	1. Shorter FAR field length requirement 2. Lower V1 3. Better stopping characteristics during reject 4. Allows higher FL.Wt. For T/O.

Review procedure for: push back / start / taxi / SID. The gradient reqd for the SID may be converted into an FPA for use with FPV. Can be useful in case of static / pitot blockage, wind shear, obstacle Clx, ADC failure.

B 777 - *200 LR*

PERFORMANCE GUIDELINES

Issued By
OPERATIONS TRAINING DIVISION

B777 WEIGHT LIMITATION

	Kgs
Maximum Taxi Weight	348,358
Maximum Takeoff Weight	347,451
Maximum Landing Weight	223,167
Maximum Zero Fuel Weight	209,106
Dry Operating Weight	168.500 ± 200
Total Fuel	145,500 (SP.GR=0.8025)

MINIMUM TAKEOFF WEIGHT (PD 10.1)

OAT (Deg C)	AIRPORT PRESSURE ALTITUDE (FT)								
	SL & Below	1000	2000	3000	4000	5000	6000	7000	8000 & Above
50	459.8								
45	169.6	162.9	155.7						
40	179.0	172.0	164.8	158.3					
35	187.6	180.4	172.9	166.2	159.6				
30	190.0	186.2	179.6	172.7	166.0	159.7			
25	190.2	186.4	182.0	177.3	171.4	165.7			
20	190.5	186.6	182.1	177.4	172.8	168.1	161.8	154.4	
15	190.7	186.7	182.3	177.6	172.9	168.3	162.8	156.3	
10	190.9	186.9	182.4	177.7	173.0	168.4	162.9	156.4	
07 & Below	191.2	187.2	182.7	178.0	173.3	168.6	163.1	156.5	

Note :

Takeoff at the -110B1L thrust rating required observance of a minimum takeoff weight in order to maintain airplane controllability during takeoff. For takeoff at weight below the minimum takeoff weight, use of a lower thrust rating and/or the assumed temperature method of thrust reduction is required.

Takeoff % N1

Based on engine bleeds for packs on, engine anti-ice on or off and wing anti-ice off.

MAX. TAKEOFF THRUST

AIRPORT OAT		AIRPORT PRESSURE ALTITUDE (FT)											
ºC	ºF	-2000	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000	8400
70	158	91.4	91.7	92.0	91.8	91.7	91.8	91.9	91.9	91.8	91.2	90.3	89.9
60	140	94.3	94.6	94.8	94.7	94.6	94.7	94.7	94.7	94.7	94.1	93.2	92.8
55	131	95.7	96.0	96.2	96.1	96.0	96.1	96.1	96.1	96.1	95.5	94.6	94.2
50	122	97.1	97.5	98.0	97.6	97.3	97.4	97.5	97.5	97.4	96.8	95.9	95.6
45	113	98.5	98.9	99.4	99.1	98.8	98.7	98.8	98.8	98.7	98.2	97.3	96.9
40	104	99.6	100.2	100.9	100.4	100.2	100.0	99.9	100.0	99.9	99.4	98.6	98.2
35	95	99.3	100.8	102.8	102.3	101.8	101.4	101.2	101.3	101.0	100.4	99.6	99.3
30	86	98.5	99.9	102.7	104.0	104.0	103.8	103.4	103.4	102.6	101.5	100.7	100.3
25	77	97.7	99.1	101.8	103.1	104.4	105.5	105.8	106.3	105.3	103.8	102.4	101.8
20	68	96.9	98.3	101.0	102.3	103.5	104.6	105.8	106.8	106.8	105.9	104.8	104.3
15	59	96.0	97.4	100.1	101.4	102.6	103.7	104.9	105.9	106.4	106.1	105.6	105.3
10	50	95.2	96.6	99.2	100.5	101.7	102.8	103.9	105.0	105.5	105.2	104.9	104.7
5	41	94.4	95.7	98.4	99.6	100.8	101.9	103.0	104.1	104.5	104.2	104.0	103.8
0	32	93.5	94.9	97.5	98.7	99.9	101.0	102.1	103.1	103.6	103.3	103.0	102.9
-10	14	91.8	93.1	95.7	96.9	98.1	99.1	100.2	101.2	101.7	101.4	101.1	101.0
-20	-4	90.0	91.3	93.8	95.0	96.2	97.2	98.3	99.3	99.7	99.4	99.2	99.0
-30	-22	88.2	89.5	92.0	93.1	94.3	95.3	96.3	97.3	97.7	97.5	97.2	97.1
-40	-40	86.4	87.6	90.1	91.2	92.3	93.3	94.3	95.3	95.7	95.4	95.2	95.1
-50	-58	84.5	85.7	88.1	89.2	90.3	91.3	92.3	93.2	93.6	93.4	93.1	93.0

% N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)											
	-2000	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000	8400
PACKS OFF	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
ONE PACKS ON	-0.2	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3
WING ANTI-ICE ON	-0.2	-0.3	-0.4	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4

For the 777 with GE engines, operators have to observe the FAA established 25% thrust derate limit for reduced thrust takeoffs when using the Assumed Temperature method. In case of assumed temperature reduced thrust takeoff for 777 with GE engines, the 75% rated thrust is assured by the FMS, which provides the maximum assumed temperature and the %N1 for 25% thrust reduction. We do not provide any tables to determine the %N1 value for the 25% thrust derate for assumed temperature method.

The FMC, using the first principle calculations, can compute a more accurate Max assumed temperature and the corresponding % N1 for the 25% thrust reduction, for the actual takeoff weight and prevailing conditions. The %N1 being a function of different variables, it is difficult to provide a single table or tables to account for the different variables and determine an accurate %N1 value to indicate the 25% reduced thrust.

In view of the above, it is a minimum requirement that one FMS must be functional for all takeoffs.

Maximum Assumed Temperature

Our B777-200LR aircrafts are fitted with GE90-110B1L engines. These aircrafts can be operated at full rated take-off thrust or it's applicable derates.

The current AFM, FPPM and QRH does not provide the maximum assumed temperature limit value except for the statement that the maximum assumed temperature limit shall not exceed 25% thrust reduction.

The take-off data, speeds and assumed temperature are computed upto a limit of 70°A. However, the FMC computes for a given rating, the maximum assumed temperature ensuring thrust reduction is limited to 25% for a given OAT and pressure altitude.

The following table has been prepared to provide the above information about the maximum assumed temperature limit that can be set in the FMC CDU for a given OAT and pressure altitude.

Note: FMC Max assumed Temperature could vary by a Degree compared to the value given in the following table.

OAT (Deg C)	Pressure Altitude (in ft.)								
	0	1000	2000	3000	4000	5000	6000	7000	8000
0	58°	57°	56°	55°	54°	54°	53°	52°	50°
10	58°	57°	56°	55°	54°	54°	53°	52°	50°
20	58°	57°	56°	55°	54°	54°	53°	53°	51°
30	58°	57°	57°	57°	57°	57°	58°	58°	57°
35	59°	59°	59°	60°	61°	61°	61°	61°	60°
40	64°	64°	64°	65°	65°	65°	65°	65°	-
45	68°	69°	69°	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-	-

The above data is for the reference of the Flight Despatchers and the Crew for determining the max assumed temperature value and other related data for departure.

TAKEOFF SPEEDS – DRY RUNWAY
V1, VR, V2 for Max Takeoff Thrust

WEIGHT (1000 KG)	FLAPS 5			FLAPS 15			FLAPS 20		
	V1	VR	V2	V1	VR	V2	V1	VR	V2
360	175	184	186	167	174	178	164	170	175
340	171	180	183	164	170	176	159	165	171
320	166	174	179	158	165	171	154	159	167
300	160	167	174	152	158	166	148	153	162
280	153	160	168	146	152	161	142	147	157
260	146	153	163	138	145	156	134	140	152
240	138	146	157	130	138	151	126	133	146
220	129	138	151	122	131	145	118	126	141
200	120	129	145	113	123	139	110	118	135
180	110	120	138	103	114	132	99	110	128
160	99	111	131	93	105	125	88	101	131
140	88	102	123	82	96	118	76	91	114

Check V1 (MCG) and Minimum Takeoff Weight.
V1, VR, V2 Adjustments *

TEMP		V1						VR						V2					
		PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)					
°C	°F	-2	0	2	4	6	8	-2	0	2	4	6	8	-2	0	2	4	6	8
70	158	12	15					6	7					-2	-3				
60	140	8	10	13	15			4	5	7	8			-2	-2	-2	-3		
50	122	4	6	8	11	14	17	2	3	5	6	7	9	-1	-1	-2	-2	-2	-3
40	104	1	2	5	7	10	14	1	1	3	4	6	8	0	-1	-1	-1	-2	-2
30	86	0	0	2	4	7	11	0	0	1	3	4	6	0	0	0	-1	-1	-2
20	68	0	0	1	3	5	9	0	0	1	2	3	5	0	0	0	-1	-1	-2
-60	-76	0	0	1	3	5	8	0	0	1	2	3	7	0	0	0	-1	-1	-1

Slope and Wind V1 Adjustments *

WEIGHT (1000KG)	SLOPE (%)					WIND (KTS)							
	-2	-1	0	1	2	-15	-10	-5	0	10	20	30	40
360	-4	-2	0	3	6	-3	-2	0	0	1	2	3	4
340	-4	-1	0	3	5	-3	-2	0	0	1	2	3	3
320	-3	-1	0	3	5	-2	-1	0	0	1	2	3	3
300	-3	-1	0	3	4	-2	-1	0	0	1	2	3	3
280	-3	-1	0	3	4	-2	-1	0	0	1	2	2	3
260	-2	-1	0	2	4	-2	-1	0	0	1	2	2	3
240	-2	0	0	2	4	-1	-1	0	0	1	2	3	3
220	-2	0	0	2	4	-1	0	0	0	1	2	3	3
200	-2	0	0	3	4	-1	0	0	0	1	2	3	3
180	-1	0	0	3	4	-1	0	1	0	1	3	3	4
160	-1	0	0	3	4	-1	0	1	0	1	3	3	4
140	-1	0	0	3	4	-1	0	1	0	1	3	4	4

Max Allowable Clearway for V1 Adjustment

FIELD LENGTH (FT)	4000	6000	8000	10000	12000	17000
MAX ALLOWABLE CLEARWAY (FT)	490	650	850	1000	1150	1450

Clearway and Stopway V1 Adjustments *

Normal V1 (KIAS)	CLEARWAY MINUS STOPWAY (FT)								
	800	600	400	200	0	-200	-400	-600	-800
100	-2	-2	-2	-1	0	3	4	7	7
120	-3	-3	-2	-1	0	3	4	6	6
140	-3	-3	-2	-1	0	2	3	5	5
160	-3	-2	-2	-1	0	2	2	4	5

*** V1 not to exceed VR**

V1 (MCG)
Max Takeoff Thrust

TEMP		PRESSURE ALTITUDE (FT)					
º C	º F	-2000	0	2000	4000	6000	8000
70	158	125	121				
60	140	125	121	119	117		
50	122	128	125	119	117	115	110
40	104	136	133	127	122	116	110
30	86	138	137	133	127	122	115
20	68	138	138	134	130	126	119
-60	-76	140	139	135	131	127	121

TAKEOFF SPEEDS – WET RUNWAY
V1, VR, V2 for Max Takeoff Thrust

WEIGHT (1000 KG)	FLAPS 5			FLAPS 15			FLAPS 20		
	V1	VR	V2	V1	VR	V2	V1	VR	V2
360 340 320	16 8 16 3 15 6	18 4 18 0 17 4	18 6 18 3 17 9	15 9 15 5 14 8	17 4 17 0 16 5	17 8 17 6 17 1	15 6 15 0 44	17 0 16 5 15 9	17 5 17 1 16 7
300 280 260	14 9 14 1 13 3	16 7 16 0 15 3	17 4 16 8 16 3	14 1 13 4 12 6	15 8 15 2 14 6	16 6 16 1 15 6	13 7 13 0 12 2	15 3 14 7 14 0	16 2 15 7 15 2
240 220 200	12 5 11 6 10 8	14 6 13 8 12 9	15 7 15 1 14 5	11 8 11 0 10 0	13 8 13 1 12 3	15 1 14 5 13 9	11 4 10 6 99	13 3 12 6 11 8	14 6 14 1 13 5
180 160 140	97 87 78	12 1 11 1 10 2	13 8 13 1 12 3	92 81 71	11 4 10 5 96	13 2 12 5 11 8	89 78 67	11 0 10 1 91	12 8 12 1 11 4

Check V1 (MCG) and Minimum Takeoff Weight.

V1, VR, V2 Adjustments *

TEMP		V1						VR						V2					
		PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)					
°C	°F	-2	0	2	4	6	8	-2	0	2	4	6	8	-2	0	2	4	6	8
70	158	14	17					6	7					-2	-3				
60	140	9	11	14	16			4	5	7	8			-2	-2	-2	-3		
50	122	5	7	9	12	14	18	2	3	5	6	7	9	-1	-1	-2	-2	-2	-3
40	104	1	2	5	8	11	15	1	1	3	4	6	8	0	-1	-1	-1	-2	-2
30	86	0	0	2	5	8	12	0	0	1	3	4	6	0	0	0	-1	-1	-2
20	68	0	0	1	3	6	9	0	0	1	2	3	5	0	0	0	-1	-1	-2
-60	-76	0	0	1	3	5	8	0	0	1	2	3	4	0	0	0	-1	-1	-1

Slope and Wind V1 Adjustments *

WEIGHT (1000KG)	SLOPE (%)					WIND (KTS)							
	-2	-1	0	1	2	-15	-10	-5	0	10	20	30	40
360	-6	-3	0	3	6	-4	-3	-1	0	1	2	3	4
340	-6	-3	0	3	6	-4	-3	-1	0	1	2	3	4
320	-6	-3	0	3	6	-5	-3	-1	0	1	2	3	4
300	-5	-3	0	3	5	-5	-3	-1	0	1	2	3	4
280	-5	-2	0	3	5	-5	-3	-1	0	1	2	3	4
260	-4	-2	0	3	5	-5	-3	-1	0	1	3	4	5
240	-4	-2	0	3	5	-5	-3	-1	0	1	3	4	5
220	-3	-1	0	3	5	-4	-2	-1	0	2	3	4	5
200	-3	-1	0	3	5	-4	-2	0	0	2	4	5	6
180	-2	0	0	4	6	-3	-1	0	0	2	4	5	6
160	-1	1	0	4	6	-2	-1	1	0	2	5	6	7
140	0	2	0	5	6	-2	0	2	0	3	5	6	7

Stopway V1 Adjustments*

NORMAL V1 (KIAS)	STOPWAY (FT)				
	0	200	400	600	800
100	0	2	3	5	7
120	0	1	2	4	6
140	0	1	2	4	5
160	0	1	1	3	4

Use of clearway not allowed on wet runways.

***V1 not to exceed VR**

V1 (MCG)
Max Takeoff Thrust

TEMP		PRESSURE ALTITUDE (FT)					
º C	º F	-2000	0	2000	4000	6000	8000
70	158	125	121				
60	140	125	121	119	117		
50	122	128	125	119	117	115	110
40	104	136	133	127	122	116	110
30	86	138	137	133	127	122	115
20	68	138	138	134	130	126	119
-60	-76	140	139	135	131	127	121

NORMAL T/O - DRY RUNWAY
(USING RTOW TABLES)

Pressure Altitude = Elevation + (1013- QNH)× 30 =

I) RTOW Determination : (Flap 5 / 15)

Refer RTOW table of given airport, Runway and Flap setting

Maximum Allowable takeoff weight (MATOW)	=	
(Apply QNH correction* for other than Structural Limit)	=	
Corrected MATOW	=	(i)
Field length Limit weight (FLW)	=	
(Apply QNH correction*)	=	
Corrected FLW	=	(ii)
Climb limit weight (CLW)	=	
(Apply QNH correction*)	=	
Corrected CLW	=	(iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burn-off	=	(iv)
Maximum Zero Fuel Weight (MZFW) + T/O Fuel	=	(v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) **a)** IF Actual Takeoff weight is less than or equal to RTOW, then follow as under: **<u>(Full thrust Take off</u>**)

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight to make ATOW = RTOW

<u>Pg : FPPM 1.2.39</u>

T/O speeds for Actual takeoff weight:

For the selected T/O Flap

V1 = VR = V2 =

<u>Adjustments</u>

i) OAT =
ii) Slope =
iii) Wind =
iv) CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : FPPM 1.2.39</u>

Find V1MCG at OAT

Ensure corrected V1 ≥ V1MCG

<u>If corrected V1 < V1MCG</u> : Set corrected V1=V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

III) b) <u>For reduced thrust takeoff (Assumed Temp Method) proceed as under :</u>

Ensure that Actual Takeoff weight (ATOW) is less than RTOW .

ATOW + QNH correction (If QNH is below 1013) (@ 700kg / mb) =

Note: This QNH corrected actual take off weight is meant for Assumed temperature determination only not for the take off speeds calculation.

From the RTOW table, in the MATOW column with appropriate wind column, find the Assumed temperature (AT) corresponding to QNH corrected weight (if not exact, take next higher weight) .

Assumed Temperature =

For the AT find reduced T/O N1 (from FMC).

<u>T/O speeds for Actual take-off weight</u>:

<u>Pg : FPPM 1.2.39</u>

For the selected T/O Flap.

V1 = VR = V2 =

<u>Adjustments</u>

Assumed Temp =

Slope =

Wind =

CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V 2 =

Find V1MCG at OAT. Ensure V1 $\geq$ V1MCG

<u>If corrected V1 < V1MCG</u> : Set corrected V1 = V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

NORMAL T/O - DRY RWY
USING PERFORMANCE DISPATCH (FCOM- VOL I)
(T/O with Flap 15 only) (FULL THRUST T/O)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination :

Pg : PD 30.2
Find corrected R/W length (use TORA only)=

Pg : PD 30.3 to 30.5
Field length limit weight = (i)

Pg : PD 30.3 to 30.5
Climb limit weight = (ii)

Pg : PD 30.10 to 30.11
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 30.12
Tire speed Limit weight = (iv)

Structural limit weight = 347,400 Kgs.(v)

Maximum Landing weight (MLW) + Burn-off= .(vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = ..(vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi), (vii) is the RTOW.

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) Ensure that Actual Take-off weight is less than or equal to RTOW.

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : PD 30.13</u>

For the Actual take-off weight, for Flaps 15, take-off speeds

V1 = VR = V2 =

<u>Adjustments</u> :

OAT =
Slope =
Wind =

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : PD.30.14</u>

Find V1MCG at OAT

Ensure corrected V1 ≥ V1MCG

<u>If corrected V1 <</u> <u>V1MCG</u>**:** Set corrected V1 = V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1= VR = V2 =

NORMAL T/O - WET RUNWAY
(USING RTOW TABLES)

Pressure Altitude = Elevation + (1013- QNH)$\times$ 30 =

I) RTOW Determination : (Flap 5 / 15)

Refer RTOW (wet) table of given airport, Runway and Flap setting

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than =
Structural Limit)

Corrected MATOW = (i)

Field length Limit weight (FLW) =
(Apply QNH correction*) =

Corrected FLW = (ii)

Climb limit weight (CLW) =
(Apply QNH correction*) =

Corrected CLW = (iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burn-off = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) a) IF Actual Takeoff weight is less than or equal to RTOW, then follow as under: **(Full thrust Take off**)

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.40

T/O speeds for Actual takeoff weight:

For the selected T/O Flap

V1 = VR = V2 =

Adjustments

i) OAT =
ii) Slope =
iii) Wind =
iv) CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.40

Find V1MCG at OAT

Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

III) b) For reduced thrust takeoff (Assumed Temp Method) proceed as under :

Ensure that Actual Takeoff weight (ATOW) is less than RTOW .

ATOW + QNH correction (If QNH is below 1013) (@700kg/mb) =

Note: This QNH corrected actual take off weight is meant for Assumed temperature determination only not for the take off speeds calculation.

From the RTOW table, in the MATOW column with appropriate wind column, find the Assumed temperature (AT) corresponding to QNH corrected weight (if not exact, take next higher weight)

Assumed Temperature =

For the AT find reduced T/O N1 (from FMC).

T/O speeds for Actual take-off weights:

Pg: FPPM 1.2.40
For the selected T/O Flap.

V1 = VR = V2 =

Adjustments

Assumed Temp =
Slope =
Wind =
CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

Find V1MCG at OAT. Ensure V1 $\geq$ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

NORMAL T/O - WET RWY
USING PERFORMANCE DISPATCH (FCOM- VOL I)
(T/O with Flap 15 only) (FULL THRUST T/O)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination :

Pg : PD 30.6
Find corrected R/W length (use TORA only) =

Pg : PD 30.7 to 30.9
Field length limit weight = (i)

Pg : PD 30.7 to 30.9
Climb limit weight = (ii)

Pg : PD 30.10 to 30.11
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 30.12
Tire speed Limit weight = (iv)

Structural limit weight =347,400 Kgs(v)

Maximum Landing weight (MLW) + Burn-off = ……..(vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = …….(vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi) and (vii) is the RTOW.

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) Ensure that Actual Take-off weight is less than or equal to RTOW.

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD 30.15 (Wet Runway)
For the Actual take-off weight, for Flaps 15, take-off speeds

V1 = VR = V2 =

Adjustments :

OAT =
Slope =
Wind =

Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD.30.16

Find V1MCG at OAT

Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1= VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY DEACTIVATION TOOLS-USING RTOW TABLES (DRY RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination : (Flap 5 / 15)

Refer RTOW table of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =
QNH Corrected Field Length Limited weight =

Pg : FPPM 1.1.3

For one brake deactivated = minus 3700 kg
For two brakes deactivated = minus 7250 kg

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than =
Structural Limit)

Corrected MATOW = (ii)

Climb limit weight (CLW) =
Apply QNH correction* =

Corrected CLW
= (iii)
(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.39

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments

OAT =
Slope =
Wind =
CWY minus SWY =

Pg : FPPM 1.1.3

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.39

Find V1MCG at OAT. Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 5900 ft for 1 brake deactivated or 6200 ft for 2 brakes deactivated . If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY DEACTIVATION TOOLS – USING RTOW TABLES (WET RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) **RTOW Determination : (Flap 5 / 15)**

Refer RTOW table (WET) of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =
QNH Corrected Field Length Limited weight =

Pg : FPPM 1.1.3

For one brake deactivated =minus2200 Kgs
For two brakes deactivated =minus4550 Kgs

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (ii)

Climb limit weight (CLW) =
Apply QNH correction* =

Corrected CLW = (iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.40

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments
OAT =
Slope =
Wind =

Pg : FPPM 1.1.3

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.40

Find V1MCG (WET) at OAT. Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 7700 ft for 1 brake deactivated or 8100 ft for 2 brakes deactivated. If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY CAPPING BRAKE LINES USING RTOW TABLES (DRY RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH) $\times$ 30

I) <u>RTOW Determination</u> : (Flap 5 / 15)
Refer RTOW table of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =

QNH Corrected Field Length Limited weight =

<u>Pg : FPPM 1.1.3</u>

For <u>one</u> brake deactivated	= minus 3700 kg
For <u>two</u> brakes deactivated	= minus 7250 kg

Corrected field length limit weight	=	(i)
Maximum Allowable takeoff weight (MATOW)	=	
(Apply QNH correction* for other than Structural Limit)	=	
Corrected MATOW	=	(ii)

(* do not apply the corrections if QNH above 1013)

<u>Pg : FPPM 4.2.1-4.2.2</u>

Gear down Climb limit weight (CLW)	=	(iii)
Maximum Landing weight (MLW) + Burnoff	=	(iv)
Maximum Zero Fuel Weight (MZFW) + T/O Fuel	=	(v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.39

T/O speeds for Actual takeoff weight:
For the selected T/O Flap
V1 = VR = V2 =

Adjustments

OAT	=
Slope	=
Wind	=
CWY minus SWY	=

Pg : FPPM 1.1.3

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.39

Find V1MCG at OAT. Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 5900 ft for 1 brake deactivated or 6200 ft for 2 brakes deactivated. If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY CAPPING BRAKE LINES USING RTOW TABLES (WET RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW (WET) Determination : (Flap 5 / 15)
Refer RTOW table (WET) of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =

QNH Corrected Field Length Limited weight =

Pg : FPPM 1.1.3

For one brake deactivated = minus 2200 Kg
For two brakes deactivated = minus 4550 kg

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (ii)

(* do not apply the corrections if QNH above 1013)

Pg : FPPM 4.2.1-4.2.2
Gear down Climb limit weight (CLW) = (iii)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) <u>Pg : FPPM 1.2.41</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : FPPM 1.2.40</u>

T/O speeds for Actual takeoff weight:
For the selected T/O Flap
V1 = VR = V2 =

<u>Adjustments</u>

OAT =
Slope =
Wind =

<u>Pg : FPPM 1.1.3</u>

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : FPPM 1.2.40</u>

Find V1MCG (WET) at OAT. Ensure corrected V1 ≥ V1MCG

<u>If corrected V1 < V1MCG (WET)</u> : Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 7700 ft for 1 brake deactivated or 8100 ft for 2 brakes deactivated. If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY DEACTIVATION TOOL-DRY R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination :

Pg : PD 30.2
Find corrected R/W length (use TORA only) =

Pg : PD 30.3 to 30.5
Field length limit weight = F=

Pg : PD 34.3
For one brake deactivated = minus 3700 kg
For two brakes deactivated = minus 7250 kg
Corrected field length limit weight = (i)

Pg : PD 30.3 to 30.5
Climb limit weight = (ii)

Pg : PD 30.10 to 30.11
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 30.12
Tire speed Limit weight = (iv)

Structural limit weight =347,400Kgs.(v)

Maximum Landing weight (MLW) + Burnoff = (vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi) and (vii) is the RTOW

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD. 30.13(T/O Flap 15 only)

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments

OAT =
Slope =
Wind =
CWY minus SWY =

Pg : PD 34.3

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots
Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD.30.14(T/O Flap 15 only)

Find V1MCG at OAT. Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 5900 ft for 1 brake deactivated or 6200 ft for 2 brakes deactivated . If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED–BY DEACTIVATION TOOL WET R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) $\times$ 30

I) RTOW Determination :

Pg : PD 30.6
Find corrected R/W length (use TORA only) =

Pg : PD 30.7 to 30.9
Field length limit weight = F=

Pg : PD 34.3
For one brake deactivated = minus 2200 kg
For two brakes deactivated = minus 4550 kg
Corrected field length limit weight = (i)

Pg : PD 30.7 to 30.9
Climb limit weight = (ii)

Pg : PD 30.10 to 30.11
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 30.12
Tire speed Limit weight = (iv)

Structural limit weight =347,400Kgs.(v)

Maximum Landing weight (MLW) + Burnoff = (vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi) and (vii) is the RTOW

II) <u>Pg : FPPM 1.2.41</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : PD. 30.15(T/O Flap 15 only)</u>

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

<u>Adjustments</u>
OAT =
Slope =
Wind =

<u>Pg : PD 34.3</u>
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : PD.30.16(T/O Flap 15 only)</u>

Find V1MCG at OAT. Ensure corrected V1 ≥ V1MCG

<u>If corrected V1 < V1MCG</u>: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 7700 ft for 1 brake deactivated or 8100 ft for 2 brakes deactivated . If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED– BY CAPPING BRAKE LINES –DRY R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH) $\times$ 30

I) RTOW Determination :

Pg : PD 30.2
Find corrected R/W length (use TORA only) =

Pg : PD 30.3 to 30.5
Field length limit weight =

Pg : PD 34.3
For one brake deactivated = minus 3700 kg
For two brakes deactivated = minus 7250 kg

Corrected field length limit weight = (i)

Pg : PD 33.1
Gear down Climb limit weight (CLW) = (ii)

Pg : PD 30.12
Tire speed Limit weight = (iii)

Structural Limit Weight =347,400Kgs(iv)

Maximum Landing weight (MLW) + Burnoff = (v)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vi)

Brake Energy Limit weight is not limiting.

RTOW is the lowest of (i), (ii), (iii), (iv), (v) & (vi).

II) Pg : FPPM 1.2.41

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD. 30.13(T/O Flap 15 only)
T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments
OAT =
Slope =
Wind =
CWY minus SWY =

Pg : PD 34.3
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD.30.14
Find V1MCG at OAT. Ensure corrected V1 ≥ V1MCG

If corrected V1 < V1MCG : Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 5900 ft for 1 brake deactivated or 6200 ft for 2 brakes deactivated. If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED– BY CAPPING BRAKE LINES –WET R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH) $\times$ 30

I) RTOW Determination :

Pg : PD 30.6
Find corrected R/W length (use TORA only) =

Pg : PD 30.7 to 30.9
Field length limit weight =

Pg : PD 34.3
For one brake deactivated = minus 2200 kg
For two brakes deactivated = minus 4550 kg

Corrected field length limit weight = (i)

Pg : PD 33.1
Gear down Climb limit weight (CLW) = (ii)

Pg : PD 30.12
Tire speed Limit weight = (iii)

Structural Limit Weight =347,400Kgs(iv)

Maximum Landing weight (MLW) + Burnoff = (v)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vi)

Brake Energy Limit weight is not limiting.

RTOW is the lowest of (i), (ii), (iii), (iv), (v) & (vi).

II) <u>Pg : FPPM 1.2.41</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under:

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : PD. 30.15(T/O Flap 15 only)</u>
T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

<u>Adjustments</u>
OAT =
Slope =
Wind =

<u>Pg : PD 34.3</u>
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : PD.30.16</u>

Find V1MCG (WET) at OAT. Ensure corrected V1 ≥ V1MCG

<u>If corrected V1 < V1MCG</u> <u>(WET)</u> : Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 7700 ft for 1 brake deactivated or 8100 ft for 2 brakes deactivated. If corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

T/O PERFORMANCE WITH A CENTRE SYSTEM DEMAND AIR DRIVEN PUMPS (ADP) INOP – USING RTOW TABLES

(PERFORM FULL THRUST TAKE-OFF)

Note 1: *For APU-to-pack off function, if left ADP is inoperative, the APU –to-pack take-off supplementary procedure is not allowed.*

Note 2: *Remaining ADP heater / Auto operative or inoperative or both inoperative. Refer DDG (2-29) for further operational procedures.*

Pressure Altitude = Elevation + (1013- QNH)× 30 =

I) RTOW determination:

Refer RTOW tables for airport, R/W flap setting and wind coder

Maximum Allowable take of weight =
(Apply QNH correction* for other than
Structural limit weight) =
(If MATOW is obstacle (*) limited,
ADP inop penalty) (From DDG) = minus 4360 kgs

Corrected MATOW = (i)

Field length limited weight (FLW) =
Apply QNH correction* =
ADP inop penalty (From DDG) = minus 4360 kgs

Corrected FLW = (ii)

Climb limit weight (CLW) =

Apply QNH correction* =
ADP inop penalty (From DDG) = minus 771 kgs

Corrected CLW = (iii)
(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burnoff	=	(iv)
Maximum Zero Fuel Weight + T/O Fuel	=	(v)

RTOW is the least of (i), (ii), (iii), (iv) and (v)

II) <u>Pg : FPPM 1.2.41</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : FPPM 1.2.39</u>

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

<u>Adjustments</u>

i) OAT =
ii) Slope =
iii) Wind =
iv) CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : FPPM 1.2.39</u>

Find V1MCG at OAT. Ensure corrected V1 ≥ V1MCG

<u>If corrected V1 < V1MCG</u>: Set corrected V1 = V1MCG; if corrected VR is less than V1MCG, set corrected VR equal to V1MCG and determine a new V2 by adding the difference between the normal VR and V1MCG to the normal V2.

Final V1 = VR = V2 =

ENROUTE PERFORMANCE

ALL ENGINES

LONG RANGE CRUISE MAX OPERATING ALTITUDE

PI 31.1, 31.2
PD 31.1, 31.2
FPPM 3.2.1, 3.2.2

LONG RANGE CRUISE CONTROL

PI 31.3
FPPM 3.2.13 - 3.2.22

INFLIGHT DIVERSION – ALL ENGINES

LRC ENROUTE FUEL AND TIME- LOW ALTITUDE

PI 31.4
FPPM 3.2.11

LRC ENROUTE FUEL AND TIME- HIGH ALTITUDE

PI 31.5, 31.6
FPPM 3.2.12

LRC TRIP FUEL AND TIME

PD 31.3, 31.4
FPPM 2.2.2, 2.2.3

LRC STEP CLIMB TRIP FUEL AND TIME

PD 31.5
FPPM 2.2.8

SHORT TRIP FUEL AND TIME

PD 31.6
FPPM 2.2.11

HOLDING PLANNING / PARAMETERS

PD	31.7	/	**PI**	31.7, 31.8
FPPM	2.2.13	/	**FPPM**	3.2.27

NET LEVEL OFF – ENG INOP

PD 31.10
FPPM 2.3.1

LRC CRITICAL FUEL RESERVES – ALL ENGINE/ENG INOP

PD 31.11 / PD 31.12, 31.13(D/D)

DESCENT

PI 31.6
FPPM 3.2.26

WIND ALTITUDE TRADE

PI 31.6
FPPM 3.2.25

PRESENT

NEW

1) FLIGHT LEVEL

2) WIND ACTUAL

3) WIND FACTOR
(Directly From Chart LRC/.86 Cruise)

4) DIFFERENCE IN WIND FACTOR
(New Alt Wind Factor Minus Present Alt Wind Factor)

5) BREAK-EVEN WIND
(Present Alt Wind Plus Difference In Wind Factor)

6) BENEFIT / LOSS
(Available Alt Wind Minus Break Even Wind)

If Benefit is negative & hence equals Loss, do not accept change in Flight Level

LANDING PERFORMANCE

VREF

PI 30.2

MLW & FAR LANDING DISTANCE

FAR Landing Distance (Dry) = ALD (Without Rev.) / 0.6
FAR Landing Distance (Wet) = FAR Landing Dist (Dry) *1.15

Calculation for MLW

Landing Field Limit Weight – Dry Runway – (i)
PD 32.1, 32.2
FPPM 1.4.1 (Flap 30), 1.4.2 (Flap 25)

Landing Field Limit Weight – Wet Runway
PD 32.3
FPPM 1.4.1 (Flap 30), 1.4.2 (Flap 25)

Landing Climb Limit Weight – (ii)
PI 32.8
PD 32.4
FPPM 1.4.3 (Approach Flap 20, Landing Flap 30)
1.4.4 (Approach Flap 20, Landing Flap 25)

Structural Limited Landing Weight = 223,167 – (iii)

Maximum Landing Weight is lower of (i), (ii) & (iii)

NORMAL CONFIGURATION LANDING DIST. (ALD)

PI 32.1 (Flap 30)**, 32.2** (Flap 25)**, 32.3** (Flap 20)
FPPM 1.4.9 (Flap 30)**, 1.4.10** (Flap 25)**, 1.4.11** (Flap 20)

NON-NORMAL CONFIGURATION LANDING DIST. (ALD)

PI 32.4 - 32.7

QUICK TURN AROUND LIMIT WEIGHT

PD 32.6
FPPM 1.4.6

ENGINE INOPERATIVE PERFORMANCE

DRIFT DOWN SPEED / LEVEL OFF ALTITUDE – E/O

PI 33.5 OR PI.QRH 32.5

LRC ALTITUDE CAPABILITY – E/O

PI 33.7 OR PI.QRH 32.7
FPPM 3.3.1

ENGINE INOPERATIVE – LRC PARAMETERS

PI 33.8 OR PI.QRH 32.8
FPPM 3.3.6 – 3.3.12

LRC DIVERSION FUEL AND TIME – E/O

PI 33.9 OR PI.QRH 32.9
FPPM 3.3.29

HOLDING – E/O

PI 33.10 OR PI.QRH 32.10
FPPM 3.3.24

NET LEVEL OFF WEIGHT – E/O

PD 31.10
FPPM 2.3.1

LRC NET LEVEL OFF WEIGHT – E/O

FPPM 2.4.13

CREW OXYGEN REQUIREMENT

PD 31.8, 31.9
FPPM 2.2.15, 2.2.16

RECOMMENDED BRAKE COOLING SCHEDULE

PI 32.10, 32.11
FPPM 1.4.7, 1.4.8

B777 - *300 ER*

PERFORMANCE GUIDELINES

Issued By
OPERATIONS TRAINING DIVISION

B777 WEIGHT LIMITATION

	Kgs
Maximum Taxi Weight	344,730
Maximum Takeoff Weight	343,822
Maximum Landing Weight	251,290
Maximum Zero Fuel Weight	237,682
Dry Operating Weight	180.200 ± 200
Total Fuel	145,000 (SP.GR=0.8029)

Takeoff % N1

Based on engine bleeds for packs on, engine anti-ice on or off and wing anti-ice off.

MAX. TAKEOFF THRUST

AIRPORT OAT		AIRPORT PRESSURE ALTITUDE (FT)											
° C	° F	-2000	-1000	0	1000	2000	3000	4000	5000	6000	7000	8000	8400
70	158	92.2	92.4	92.8	92.5	92.3	92.3	92.2	92.0	91.8	91.2	90.3	89.9
60	140	95.1	95.3	95.7	95.4	95.2	95.2	95.0	94.9	94.7	94.1	93.2	92.8
55	131	96.4	96.7	97.0	96.7	96.5	96.6	96.4	96.3	96.1	95.5	94.6	94.2
50	122	97.8	98.1	98.6	98.2	97.9	97.9	97.8	97.6	97.4	96.8	95.9	95.6
45	113	99.3	99.6	100.1	99.8	99.4	99.3	99.1	98.9	98.8	98.2	97.3	96.9
40	104	100.6	101.2	101.9	101.4	101.0	100.8	100.6	100.4	100.0	99.4	98.6	98.2
35	95	101.3	102.7	104.7	104.2	103.1	102.6	102.1	101.7	101.1	100.4	99.6	99.3
30	86	100.5	103.7	106.9	106.4	105.6	105.0	104.3	103.7	102.6	101.5	100.7	100.3
25	77	99.7	102.8	106.0	106.7	107.3	107.2	106.7	106.5	105.3	103.8	102.4	101.8
20	68	98.8	101.9	105.1	105.8	106.4	106.8	107.1	107.5	106.8	105.9	104.8	104.3
15	59	98.0	101.1	104.2	104.9	105.5	105.8	106.2	106.5	106.4	106.1	105.6	105.3
10	50	97.1	100.2	103.3	104.0	104.6	104.9	105.3	105.6	105.5	105.2	104.9	104.8
5	41	96.3	99.3	102.4	103.0	103.7	104.0	104.3	104.7	104.5	104.2	104.0	103.8
0	32	95.4	98.4	101.4	102.1	102.7	103.1	103.4	103.7	103.6	103.3	103.0	102.9
-10	14	93.6	96.6	99.6	100.2	100.8	101.2	101.5	101.8	101.7	101.4	101.1	101.0
-20	-4	91.8	94.7	97.7	98.3	98.9	99.2	99.5	99.9	99.7	99.5	99.2	99.1
-30	-22	90.0	92.8	95.7	96.3	96.9	97.2	97.5	97.9	97.7	97.5	97.2	97.1
-40	-40	88.1	90.9	93.7	94.3	94.9	95.2	95.5	95.8	95.7	95.4	95.2	95.1
-50	-58	86.2	88.9	91.7	92.3	92.9	91.1	91.4	93.8	93.6	93.4	91.1	91.0

% N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	AIRPORT PRESSURE ALTITUDE (FT)											
	-2000	-1000	0	1000	2000	300 0	4000	5000	6000	7000	8000	8400
PACKS OFF	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
1 PACK ON	-0.2	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3	-0.3
WING ANTI-ICE ON	-0.2	-0.3	-0.4	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4	0.4	-0.4	0.4

For the 777 with GE engines, operators have to observe the FAA established 25% thrust derate limit for reduced thrust takeoffs when using the Assumed Temperature method. In case of assumed temperature reduced thrust takeoff for 777 with GE engines, the 75% rated thrust is assured by the FMS, which provides the maximum assumed temperature and the %N1 for 25% thrust reduction. We do not provide any tables to determine the %N1 value for the 25% thrust derate for assumed temperature method.

The FMC, using the first principle calculations, can compute a more accurate Max assumed temperature and the corresponding % N1 for the 25% thrust reduction, for the actual takeoff weight and prevailing conditions. The %N1 being a function of different variables, it is difficult to provide a single table or tables to account for the different variables and determine an accurate %N1 value to indicate the 25% reduced thrust.

In view of the above, it is a minimum requirement that one FMS must be functional for all takeoffs.

Maximum Assumed Temperature

Our B777-300ER aircrafts are fitted with GE90-115BL engines. These aircrafts can be operated at full rated take-off thrust or it's applicable derates.

The current AFM, FPPM and QRH does not provide the maximum assumed temperature limit value except for the statement that the maximum assumed temperature limit shall not exceed 25% thrust reduction.

The take-off data, speeds and assumed temperature are computed upto a limit of 70°A. However, the FMC computes for a given rating, the maximum assumed temperature ensuring thrust reduction is limited to 25% for a given OAT and pressure altitude.

The following table has been prepared to provide the above information about the maximum assumed temperature limit that can be set in the FMC CDU for a given OAT and pressure altitude.

Note: FMC Max assumed Temperature could vary by a Degree compared to the value given in the following table.

OAT (Deg C)	Pressure Altitude (in ft.)								
	0	1000	2000	3000	4000	5000	6000	7000	8000
0	58°	57°	56°	55°	55°	54°	54°	52°	51°
10	58°	57°	56°	55°	55°	54°	54°	52°	51°
20	58°	57°	56°	55°	55°	54°	54°	53°	52°
30	58°	57°	58°	58°	58°	58°	59°	58°	57°
35	60°	60°	60°	61°	61°	61°	61°	61°	61°
40	64°	64°	65°	65°	65°	65°	65°	65°	-
45	69°	69°	69°	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-
54	-	-	-	-	-	-	-	-	-

The above data is for the reference of the Flight Despatchers and the Crew for determining the max assumed temperature value and other related data for departure.

TAKEOFF SPEEDS – DRY RUNWAY
V1, VR, V2 for Max Takeoff Thrust

WEIGHT (1000 KG)	FLAPS 5			FLAPS 15			FLAPS 20		
	V1	VR	V2	V1	VR	V2	V1	VR	V2
380	185	196	201	175	184	190	171	176	182
360	179	190	196	170	179	185	166	171	178
340	175	185	192	165	174	181	162	166	174
320	169	179	187	160	168	177	156	161	170
300	164	172	182	154	162	172	151	155	165
280	157	165	177	148	155	167	145	148	160
260	150	158	171	142	149	162	138	142	155
240	142	151	166	134	142	156	131	135	150
220	133	143	160	126	134	151	122	128	145
200	123	135	154	117	127	145	113	121	139
180	114	126	147	107	118	139	103	113	133
160	104	117	139	97	110	131	93	105	126

Check V1 (MCG) and Minimum VR.
V1, VR, V2 Adjustments *

TEMP		V1						VR						V2					
		PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)					
ºC	º F	-2	0	2	4	6	8	-2	0	2	4	6	8	-2	0	2	4	6	8
70	158	12	14					7	8					-4	-4				
60	140	8	10	12	14			4	6	7	8			-3	-3	-4	-4		
50	122	5	6	8	10	13	16	3	4	5	6	8	9	-2	-2	-3	-3	-4	-5
40	104	1	3	5	7	10	13	1	2	3	5	6	8	-1	-1	-2	-2	-3	-4
30	86	0	0	2	5	8	11	0	0	2	3	5	7	0	0	-1	-2	-2	-3
20	68	0	0	2	4	6	9	0	0	1	2	4	6	0	0	-1	-1	-2	-3
-60	-76	0	0	2	4	6	8	0	0	1	2	4	5	0	0	-1	-1	-2	-2

Slope and Wind V1 Adjustments *

WEIGHT (1000 KG)	SLOPE (%)					WIND (KTS)							
	-2	-3	0	1	2	-15	-10	-5	0	10	20	30	40
380	-4	-1	0	3	5	-2	-1	0	0	1	3	4	4
360	-4	-1	0	3	5	-2	-1	0	0	1	3	3	4
340	-3	-1	0	3	4	-2	-1	0	0	1	3	3	3
320	-3	-1	0	2	4	-2	-1	0	0	1	2	3	3
300	-3	-1	0	2	4	-2	-1	0	0	1	2	2	3
280	-2	-1	0	2	3	-2	-1	0	0	1	2	2	3
260	-2	0	0	2	3	-2	-1	0	0	1	2	2	3
240	-2	0	0	2	3	-1	-1	0	0	1	2	2	3
220	-1	0	0	2	3	-1	-1	0	0	1	2	2	3
200	-1	0	0	3	4	-1	0	0	0	1	2	3	4
180	-1	0	0	3	4	-1	0	1	0	1	3	3	4
160	-1	1	0	3	4	-1	0	1	0	2	3	4	5

Max Allowable Clearway for V1 Adjustment

FIFLD LENGTH (FT)	4000	6000	8000	10000	12000	14000	16000
MAX ALLOWABLE CLEARWAY (FT)	420	560	680	790	870	1000	1160

Clearway and Stopway V1 Adjustments *

NORMAL V1 (KIAS)	CLEARWAY MINUS STOPWAY (FT)										
	1000	800	600	400	200	0	-200	-400	-600	-800	-1000
100	-3	-3	-3	-2	-1	0	3	5	8	8	8
120	-3	-3	-3	-2	-1	0	3	5	7	8	8
140	-3	-3	-3	-1	0	0	3	4	5	5	5
160	-3	-3	-2	-1	0	-	2	3	3	3	3
180	-3	-3	-2	-1	0	0	1	2	3	3	3
						0					

*** V1 not to exceed VR**

V1 (MCG), Minimum VR
Max Takeoff Thrust

TEMP		PRESSURE ALTITUDE (FT)											
		-2000		0		2000		4000		6000		8000	
°C	°F	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR
70	158	116	118	113	115								
60	140	116	118	113	115	111	113	109	111				
50	122	119	121	116	118	111	113	109	111	106	109	103	106
40	104	126	127	123	124	118	120	113	115	108	111	103	106
30	86	128	130	128	130	123	125	118	120	112	115	106	109
20	68	129	130	129	130	125	126	120	122	116	118	110	113
-60	-76	130	130	130	130	126	126	121	122	117	118	112	114

TAKEOFF SPEEDS – WET RUNWAY
V1, VR, V2 for Max Takeoff Thrust

WEIGHT (1000 KG)	FLAPS 5			FLAPS 15			FLAPS 20		
	V1	VR	V2	V1	VR	V2	V1	VR	V2
380	180	196	201	169	184	190	165	176	182
360	173	190	196	163	179	185	158	171	178
340	167	185	192	157	174	181	153	166	174
320	160	179	187	151	168	177	147	161	170
300	153	172	182	144	162	172	140	155	165
280	146	165	177	137	155	167	133	148	160
260	138	158	171	130	149	162	126	142	155
240	130	151	166	122	142	156	119	135	150
220	121	143	160	114	134	151	111	128	145
200	112	135	154	106	127	145	103	121	139
180	102	126	147	96	118	139	93	113	133
160	92	117	139	88	110	131	84	105	126

Check V1 (MCG) and Minimum VR.

V1, VR, V2 Adjustments *

TEMP		V1						VR						V2					
		PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)						PRESSURE ALTITUDE (1000 FT)					
°C	°F	-2	0	2	4	6	8	-2	0	2	4	6	8	-2	0	2	4	6	8
70	158	14	16					7	8					-4	-4				
60	140	10	11	14	16			4	6	7	8			-3	-3	-4	-4		
50	122	5	7	9	12	14	17	3	4	5	6	8	9	-2	-2	-3	-3	-4	5
40	104	2	3	6	8	11	14	1	2	3	6	6	8	-1	-1	-2	-2	-3	-4
30	86	0	0	3	5	8	12	0	0	2	5	5	7	0	0	-1	-2	-2	-3
20	68	0	0	2	4	7	10	0	0	1	4	4	6	0	0	-1	-1	-2	-3
-60	-76	0	0	2	4	6	9	0	0	1	4	4	5	0	0	-1	-1	-2	-2

Slope and Wind V1 Adjustments *

WEIGHT (1000 KG)	SLOPE (%)					WIND (KTS)							
	-2	-1	0	1	2	-15	-10	-5	0	10	20	30	40
380	-6	-3	0	3	6	-3	-2	-1	0	1	2	3	4
360	-6	-3	0	3	6	-4	-3	-1	0	1	2	3	4
340	-6	-3	0	3	5	-4	-3	-1	0	1	2	3	4
320	-5	-3	0	3	5	-5	-3	-2	0	1	2	3	4
300	-5	-3	0	2	5	-5	-3	-2	0	1	2	3	4
280	-5	-2	0	2	5	-5	-3	-2	0	1	2	3	4
260	-4	-2	0	2	4	-5	-3	-1	0	1	2	3	4
240	-4	-2	0	2	4	-5	-3	-1	0	1	3	4	5
220	-3	-1	0	3	4	-5	-3	-1	0	1	3	4	5
200	-2	-1	0	3	5	-4	-2	-1	0	2	3	4	5
180	-2	0	0	3	5	-4	-2	0	0	2	4	5	6
160	-1	1	0	4	5	-3	-2	0	0	2	4	6	7

Stopway V1 Adjustments*

NORMAL V1 (KIAS)	STOPWAY (FT)					
	0	200	400	600	800	1000
100	0	2	4	5	6	7
120	0	2	3	4	5	7
140	0	1	2	2	1	4
160	0	0	1	2	2	3
180	0	0	1	2	2	3

Use of clearway not allowed on wet runways.

***V1 not to exceed VR**

V1 (MCG), Minimum VR
Max Takeoff Thrust

TEMP		PRESSURE ALTITUDE (FT)											
		-2000		0		2000		4000		6000		8000	
°C	°F	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR	V1 (MCG)	Min VR
70	158	116	118	113	115								
60	140	116	118	113	115	111	113	109	111				
50	122	119	121	116	118	111	113	109	111	106	109	103	106
40	104	126	127	123	124	118	120	113	115	108	111	103	106
30	86	128	130	128	130	123	125	118	120	112	115	106	109
20	68	129	130	129	130	125	126	120	122	116	118	110	113
-60	-76	130	130	130	130	126	126	121	122	117	118	112	114

NORMAL T/O - DRY RUNWAY (USING RTOW TABLES)

Pressure Altitude = Elevation + (1013- QNH) × 30 =

I) RTOW Determination : (Flap 5 / 15)

Refer RTOW table of given airport, Runway and Flap setting

Maximum Allowable takeoff weight (MATOW)	=	
(Apply QNH correction* for other than Structural Limit)	=	
Corrected MATOW	=	(i)
Field length Limit weight (FLW)	=	
(Apply QNH correction*)	=	
Corrected FLW	=	(ii)
Climb limit weight (CLW)	=	
(Apply QNH correction*)	=	
Corrected CLW	=	(iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burn-off = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) a) IF Actual Takeoff weight is less than or equal to RTOW, then follow as under: **(Full thrust Take off**)

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight to make ATOW = RTOW

Pg : FPPM 1.2.37

T/O speeds for Actual takeoff weight:

For the selected T/O Flap
V1 = VR = V2 =

Adjustments

i) OAT =
ii) Slope =
iii) Wind =
iv) CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.37

Find V1MCG at OAT and minimum VR.

Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

III) b) <u>For reduced thrust takeoff (Assumed Temp Method) proceed as under :</u>

Ensure that Actual Takeoff weight (ATOW) is less than RTOW .

ATOW +QNH correction (If QNH is below 1013)(@ 700kg /mb) =

Note: This QNH corrected actual take off weight is meant for Assumed temperature determination only not for the take off speeds calculation.

From the RTOW table, in the MATOW column with appropriate wind column, find the Assumed temperature (AT) corresponding to QNH corrected weight (if not exact, take next higher weight) .

Assumed Temperature =

For the AT find reduced T/O N1 (from FMC).

<u>T/O speeds for Actual take-off weight</u>:

<u>Pg : FPPM 1.2.37</u>

For the selected T/O Flap.

V1 = VR = V2 =

<u>Adjustments</u>

Assumed Temp =

Slope =

Wind =

CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

NORMAL T/O - DRY RWY
USING PERFORMANCE DISPATCH (FCOM- VOL I)
(T/O with Flap 15 only) (FULL THRUST T/O)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination :

Pg : PD 40.1
Find corrected R/W length (use TORA only) =

Pg : PD 40.2 to 40.4
Field length limit weight = (i)

Pg : PD 40.2 to 40.4
Climb limit weight = (ii)

Pg : PD 40.9 to 40.10
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 40.11
Tire speed Limit weight = (iv)

Structural limit weight =343,800Kgs(v)

Maximum Landing weight (MLW) + Burn-off = (vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi), (vii) is the RTOW.

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) Ensure that Actual Take-off weight is less than or equal to RTOW.

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD 40.12

For the Actual take-off weight, for Flaps 15, take-off speeds

V1 = VR = V2 =

Adjustments :

OAT =
Slope =
Wind =

Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD 40.13

Find V1MCG at OAT and minimum VR.

Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1= VR = V2 =

NORMAL T/O - WET RUNWAY
(USING RTOW TABLES)

Pressure Altitude = Elevation + (1013- QNH)$\times$ 30 =

I) RTOW Determination : (Flap 5 / 15)

Refer RTOW (wet) table of given airport, Runway and Flap setting

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (i)

Field length Limit weight (FLW) =
(Apply QNH correction*) =

Corrected FLW = (ii)

Climb limit weight (CLW) =
(Apply QNH correction*) =

Corrected CLW = (iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burn-off = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) a) IF Actual Takeoff weight is less than or equal to RTOW, then follow as under: **(Full thrust Take off**)

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.38

T/O speeds for Actual takeoff weight:

For the selected T/O Flap

V1 = VR = V2 =

Adjustments

i) OAT =
ii) Slope =
iii) Wind =
iv) CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.38

Find V1MCG at OAT and minimum VR.

Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.**Final**

V1 = VR = V2 =

III) b) <u>For reduced thrust takeoff (Assumed Temp Method) proceed as under</u> :

Ensure that Actual Takeoff weight (ATOW) is less than RTOW .

ATOW + QNH correction (If QNH is below 1013) (@ 700kg / mb) =

Note: This QNH corrected actual take off weight is meant for Assumed temperature determination only not for the take off speeds calculation.

From the RTOW table, in the MATOW column with appropriate wind column, find the Assumed temperature (AT) corresponding to QNH corrected weight (if not exact, take next higher weight)

Assumed Temperature =

For the AT find reduced T/O N1 (from FMC).

<u>T/O speeds for Actual take-off weights</u>:

<u>Pg: FPPM 1.2.38</u>
For the selected T/O Flap.

V1 = VR = V2 =

<u>Adjustments</u>

Assumed Temp	=
Slope	=
Wind	=
CWY minus SWY	=

Corrected V1 =Corrected VR = Corrected V2 =

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

NORMAL T/O - WET RWY
USING PERFORMANCE DISPATCH (FCOM- VOL I)
(T/O with Flap 15 only) (FULL THRUST T/O)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination :

Pg : PD 40.5
Find corrected R/W length (use TORA only) =

Pg : PD 40.6 to 40.8
Field length limit weight = (i)

Pg : PD 40.6 to 40.8
Climb limit weight = (ii)

Pg : PD 40.9 to 40.10
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 40.11
Tire speed Limit weight = (iv)

Structural limit weight =343,800Kgs(v)

Maximum Landing weight (MLW) + Burn-off = (vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi) and (vii) is the RTOW.

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) Ensure that Actual Take-off weight is less than or equal to RTOW.

* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD 40.14 (Wet Runway)

For the Actual take-off weight, for Flaps 15, take-off speeds

V1 = VR = V2 =

Adjustments :

OAT =
Slope =
Wind =

Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD 40.15

Find V1MCG at OAT and minimum VR.

Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1= VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY DEACTIVATION TOOLS USING RTOW TABLES (DRY RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) <u>RTOW Determination</u> : (Flap 5 / 15)

Refer RTOW table of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =
QNH Corrected Field Length Limited weight =

<u>Pg : FPPM 1.1.4</u>

For <u>one</u> brake deactivated = minus 3800 kg
For <u>two</u> brakes deactivated = minus 7700 kg

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (ii)

Climb limit weight (CLW) =
Apply QNH correction* =

Corrected CLW = (iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.37

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments

OAT	=
Slope	=
Wind	=
CWY minus SWY	=

Pg : FPPM 1.1.4

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.37

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 4900 ft for 1 brake deactivated or 5100 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY DEACTIVATION TOOLS USING RTOW TABLES (WET RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination : (Flap 5 / 15)

Refer RTOW table (WET) of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =
QNH Corrected Field Length Limited weight =

Pg : FPPM 1.1.4

For one brake deactivated = minus 2250 Kgs
For two brakes deactivated = minus 4700 Kgs

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (ii)

Climb limit weight (CLW) =
Apply QNH correction* =

Corrected CLW = (iii)

(* do not apply the corrections if QNH above 1013)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : FPPM 1.2.38

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments
OAT =
Slope =
Wind =

Pg : FPPM 1.1.4

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : FPPM 1.2.38

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 6200 ft for 1 brake deactivated or 6400 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY CAPPING BRAKE LINES USING RTOW TABLES (DRY RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) <u>RTOW Determination</u> : (Flap 5 / 15)

Refer RTOW table of given airport, Runway and Flap setting

a) Field Length Limited weight =

QNH correction* =

QNH Corrected Field Length Limited weight =

<u>Pg : FPPM 1.1.4</u>

For <u>one</u> brake deactivated = minus 3800 kg

For <u>two</u> brakes deactivated = minus 7700 kg

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =

(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (ii)

(* do not apply the corrections if QNH above 1013)

<u>Pg : FPPM 4.2.1-4.2.2</u>

Gear down Climb limit weight (CLW) = (iii)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) <u>Pg : FPPM 1.2.39</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : FPPM 1.2.37</u>

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

<u>Adjustments</u>

OAT =
Slope =
Wind =
CWY minus SWY =

<u>Pg : FPPM 1.1.4</u>

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots
Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : FPPM 1.2.37</u>

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 4900 ft for 1 brake deactivated or 5100 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY CAPPING BRAKE LINES USING RTOW TABLES (WET RUNWAY)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH)$\times$ 30

I) RTOW (WET) Determination : (Flap 5 / 15)

Refer RTOW table (WET) of given airport, Runway and Flap setting

a) Field Length Limited weight =
QNH correction* =

QNH Corrected Field Length Limited weight =

Pg : FPPM 1.1.4

For one brake deactivated = minus 2250 Kg
For two brakes deactivated = minus 4700 kg

Corrected field length limit weight = (i)

Maximum Allowable takeoff weight (MATOW) =
(Apply QNH correction* for other than Structural Limit) =

Corrected MATOW = (ii)

(* do not apply the corrections if QNH above 1013)

Pg : FPPM 4.2.1-4.2.2

Gear down Climb limit weight (CLW) = (iii)

Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (v)

RTOW is the lowest of (i), (ii), (iii), (iv) & (v)

II) <u>Pg : FPPM 1.2.39</u>
Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : FPPM 1.2.38</u>
T/O speeds for Actual takeoff weight:
For the selected T/O Flap
V1 = VR = V2 =

<u>Adjustments</u>
OAT =
Slope =
Wind =

<u>Pg : FPPM 1.1.4</u>
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : FPPM 1.2.38</u>
Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 6200 ft for 1 brake deactivated or 6400 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED BY DEACTIVATION TOOL- DRY R/W
PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) $\times$ 30

I) RTOW Determination :

Pg : PD 40.1
Find corrected R/W length (use TORA only) =

Pg : PD 40.2 to 40.4
Field length limit weight = F=

Pg : PD 44.3
For one brake deactivated = minus 3800 kg
For two brakes deactivated = minus 7700 kg
Corrected field length limit weight = (i)

Pg : PD 40.2 to 40.4
Climb limit weight = (ii)

Pg : PD 40.9 to 40.10
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 40.11
Tire speed Limit weight = (iv)

Structural limit weight =343,800 Kgs(v)

Maximum Landing weight (MLW) + Burnoff = (vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi) and (vii) is the RTOW

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD 40.12 (T/O Flap 15 only)

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments

OAT =
Slope =
Wind =
CWY minus SWY =

Pg : PD 44.3

For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD 40.13 (T/O Flap 15 only)

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 4900 ft for 1 brake deactivated or 5100 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED–BY DEACTIVATION TOOL WET R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

Pressure Altitude = Elevation + (1013 – QNH) × 30

I) RTOW Determination :

Pg : PD 40.5
Find corrected R/W length (use TORA only) =

Pg : PD 40.6 to 40.8
Field length limit weight = F=

Pg : PD 44.3
For one brake deactivated = minus 2250 kg
For two brakes deactivated = minus 4700 kg
Corrected field length limit weight = (i)

Pg : PD 40.6 to 40.8
Climb limit weight = (ii)

Pg : PD 40.9 to 40.10
Obstacle limit weight (with adjustment) = (iii)

Pg : PD 40.11
Tire speed Limit weight = (iv)

Structural limit weight =343,800 Kgs(v)

Maximum Landing weight (MLW) + Burnoff = (vi)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vii)

Brake Energy Limit weight is not limiting.

The lowest of (i), (ii), (iii), (iv), (v), (vi) and (vii) is the RTOW

II) Pg : FPPM 1.2.39

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

Pg : PD 40.14 (T/O Flap 15 only)

T/O speeds for Actual takeoff weight:
For the selected T/O Flap

V1 = VR = V2 =

Adjustments
OAT =
Slope =
Wind =

Pg : PD 44.3
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

Pg : PD 40.15 (T/O Flap 15 only)

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
If corrected V1 < V1MCG: Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 6200 ft for 1 brake deactivated or 6400 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED– BY CAPPING BRAKE LINES –DRY R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH)$\times$ 30

I) RTOW Determination :

Pg : PD 40.1
Find corrected R/W length (use TORA only) =

Pg : PD 40.2 to 40.4
Field length limit weight =

Pg : PD 44.3
For one brake deactivated = minus 3800 kg
For two brakes deactivated = minus 7700 kg

Corrected field length limit weight = (i)

Pg : PD 43.1
Gear down Climb limit weight (CLW) = (ii)

Pg : PD 40.11
Tire speed Limit weight = (iii)

Structural Limit Weight =343,800Kgs(iv)

Maximum Landing weight (MLW) + Burnoff = (v)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vi)

Brake Energy Limit weight is not limiting.

RTOW is the lowest of (i), (ii), (iii), (iv), (v) & (vi).

II) <u>Pg : FPPM 1.2.39</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : PD. 40.12(T/O Flap 15 only)</u>
T/O speeds for Actual takeoff weight:
For the selected T/O Flap
V1 = VR = V2 =

<u>Adjustments</u>
OAT =
Slope =
Wind =
CWY minus SWY =

<u>Pg : PD 44.3</u>
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 5 knots
Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : PD.40.13</u>
Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 4900 ft for 1 brake deactivated or 5100 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

1 OR 2 BRAKES DEACTIVATED– BY CAPPING BRAKE LINES –WET R/W PERFORMANCE DISPATCH (FCOM- VOL I) (T/O Flap 15 only)

(PERFORM FULL THRUST TAKE-OFF)

The MEL (DDG 2-32) release implies that the Gear Retract Braking will not be available on the affected wheels. Under this procedure the gear has to be kept extended for a minimum of 2 minutes after takeoff to allow the wheels to spin down prior to gear retraction. In view of this requirement the takeoff performance is based on gear down dispatch.

The takeoff climb limit weight will be based on gear down which is tabulated in Flight Planning and Performance Manual and Performance Dispatch (PD) section of FCOM VOL 1.

Pressure Altitude = Elevation + (1013 – QNH) $\times$ 30

I) RTOW Determination :

Pg : PD 40.5
Find corrected R/W length (use TORA only) =

Pg : PD 40.6 to 40.8
Field length limit weight =

Pg : PD 44.3
For one brake deactivated = minus 2250 kg
For two brakes deactivated = minus 4700 kg

Corrected field length limit weight = (i)

Pg : PD 43.1
Gear down Climb limit weight (CLW) = (ii)

Pg : PD 40.11
Tire speed Limit weight = (iii)

Structural Limit Weight =343,800Kgs(iv)

Maximum Landing weight (MLW) + Burnoff = (v)

Maximum Zero Fuel Weight (MZFW) + T/O Fuel = (vi)

Brake Energy Limit weight is not limiting.

RTOW is the lowest of (i), (ii), (iii), (iv), (v) & (vi).

II) <u>Pg : FPPM 1.2.39</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under:

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : PD. 40.14(T/O Flap 15 only)</u>
T/O speeds for Actual takeoff weight:
For the selected T/O Flap
V1 = VR = V2 =

<u>Adjustments</u>
OAT =
Slope =
Wind =

<u>Pg : PD 44.3</u>
For 1 brake deactivated reduce V1 by 2 knots
For 2 brake deactivated reduce V1 by 3 knots

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : PD 40.15</u>

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.
<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; and ensure that the accelerated stop distance must be at least 6200 ft for 1 brake deactivated or 6400 ft for 2 brakes deactivated. If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

T/O PERFORMANCE WITH A CENTRE SYSTEM DEMAND AIR DRIVEN PUMPS (ADP) INOP – USING RTOW TABLES

(PERFORM FULL THRUST TAKE-OFF)

Note 1: *For APU-to-pack off function, if left ADP is inoperative, the APU –to-pack take-off supplementary procedure is not allowed.*

Note 2: *Remaining ADP heater / Auto operative or inoperative or both inoperative. Refer DDG (2-29) for further operational procedures.*

Pressure Altitude = Elevation + (1013- QNH)× 30 =

I) RTOW determination:

Refer RTOW tables for airport, R/W flap setting and wind coder

Maximum Allowable take of weight =
(Apply QNH correction* for other than
Structural limit weight)
=
(If MATOW is obstacle (*) limited,
ADP inop penalty) (From DDG) = minus 4360 kgs

Corrected MATOW = (i)

Field length limited weight (FLW) =
Apply QNH correction* =
ADP inop penalty (From DDG) = minus 4360 kgs

Corrected FLW = (ii)

Climb limit weight (CLW) =

Apply QNH correction* =
ADP inop penalty (From DDG) = minus 771 kgs

Corrected CLW = (iii)

(* do not apply the corrections if QNH above 1013)
Maximum Landing weight (MLW) + Burnoff = (iv)

Maximum Zero Fuel Weight + T/O Fuel = (v)

RTOW is the least of (i), (ii), (iii), (iv) and (v)

II) <u>Pg : FPPM 1.2.39</u>

Maximum T/O Thrust N1 =

III) For Full thrust T/O proceed as under :

Ensure Actual takeoff weight is less than or equal to RTOW
* If Actual Takeoff weight (ATOW) is more than RTOW then reduce the weight and make ATOW = RTOW

<u>Pg : FPPM 1.2.37</u>

T/O speeds for Actual takeoff weight:
For the selected T/O Flap
V1 = VR = V2 =

<u>Adjustments</u>
i) OAT =
ii) Slope =
iii) Wind =
iv) CWY minus SWY =

Corrected V1 = Corrected VR = Corrected V2 =

<u>Pg : FPPM 1.2.37</u>

Find V1MCG at OAT and minimum VR. Ensure corrected V1 ≥ V1MCG and VR ≥ Min VR.

<u>If corrected V1 < V1MCG:</u> Set corrected V1 = V1MCG; If corrected VR is less than minimum VR set corrected VR = Min VR and determine a new V2 by adding the difference between the normal VR and min VR to the normal V2.

Final V1 = VR = V2 =

ENROUTE PERFORMANCE

ALL ENGINES

LONG RANGE CRUISE MAX OPERATING ALTITUDE	
PI	41.1, 41.2
PD	41.1, 41.2
FPPM	3.2.1, 3.2.2

LONG RANGE CRUISE CONTROL	
PI	41.3
FPPM	3.2.13 - 3.2.22

INFLIGHT DIVERSION – ALL ENGINES

LRC ENROUTE FUEL AND TIME- LOW ALTITUDE	
PI	41.4
FPPM	3.2.11

LRC ENROUTE FUEL AND TIME- HIGH ALTITUDE	
PI	41.5, 41.6
FPPM	3.2.12

LRC TRIP FUEL AND TIME	
PD	41.3, 41.4
FPPM	2.2.2, 2.2.3

LRC STEP CLIMB TRIP FUEL AND TIME	
PD	41.5
FPPM	2.2.8

SHORT TRIP FUEL AND TIME	
PD	41.6
FPPM	2.2.11

HOLDING PLANNING / PARAMETERS				
PD	41.7	/	PI	41.7, 41.8
FPPM	2.2.13	/	FPPM	3.2.27

NET LEVEL OFF – ENG INOP

PD 41.10
FPPM 2.3.1

LRC CRITICAL FUEL RESERVES – ALL ENGINE/ENG INOP

PD 41.11 / PD 41.12, 41.13(D/D)

DESCENT

PI 41.6
FPPM 3.2.26

WIND ALTITUDE TRADE

PI 41.6
FPPM 3.2.25

PRESENT

NEW

1) FLIGHT LEVEL

2) WIND ACTUAL

3) WIND FACTOR
(Directly From Chart LRC/.86 Cruise)

4) DIFFERENCE IN WIND FACTOR
(New Alt Wind Factor Minus Present Alt Wind Factor)

5) BREAK-EVEN WIND
(Present Alt Wind Plus Difference In Wind Factor)

6) BENEFIT / LOSS
(Available Alt Wind Minus Break Even Wind)

If Benefit is negative & hence equals Loss, do not accept change in Flight Level

LANDING PERFORMANCE

VREF

PI 40.2

MLW & FAR LANDING DISTANCE

FAR Landing Distance (Dry) = ALD (Without Rev.) / 0.6
FAR Landing Distance (Wet) = FAR Landing Dist (Dry) *1.15

Calculation for MLW

Landing Field Limit Weight – Dry Runway – (i)

PD 42.1, 42.2
FPPM 1.3.1 (Flap 30), 1.3.2 (Flap 25)

Landing Field Limit Weight – Wet Runway

PD 42.3, 42.4
FPPM 1.3.1 (Flap 30), 1.3.2 (Flap 25)

Landing Climb Limit Weight – (ii)

PI 42.8, 42.9
PD 42.5
FPPM 1.3.3 (Approach Flap 20, Landing Flap 30)
1.3.4 (Approach Flap 20, Landing Flap 25)

Structural Limited Landing Weight = 251,290 – (iii)

Maximum Landing Weight is lower of (i), (ii) & (iii)

NORMAL CONFIGURATION LANDING DIST. (ALD)

PI 42.1 (Flap 30)**, 42.2** (Flap 25)**, 42.3** (Flap 20)
FPPM 1.3.9 (Flap 30)**, 1.3.10** (Flap 25)**, 1.3.11** (Flap 20)

NON-NORMAL CONFIGURATION LANDING DIST. (ALD)

PI 42.4 - 42.7

QUICK TURN AROUND LIMIT WEIGHT

PD 42.7
FPPM 1.3.6

ENGINE INOPERATIVE PERFORMANCE

DRIFT DOWN SPEED / LEVEL OFF ALTITUDE – E/O			
PI	**43.5**	**OR**	**PI.QRH 42.5**

LRC ALTITUDE CAPABILITY – E/O			
PI	**43.7**	**OR**	**PI.QRH 42.7**
FPPM	**3.3.1**		

ENGINE INOPERATIVE – LRC PARAMETERS			
PI	**43.8**	**OR**	**PI.QRH 42.8**
FPPM	**3.3.6 – 3.3.13**		

LRC DIVERSION FUEL AND TIME – E/O			
PI	**43.9**	**OR**	**PI.QRH 42.9**
FPPM	**3.3.30**		

HOLDING – E/O			
PI	**43.10**	**OR**	**PI.QRH 42.10**
FPPM	**3.3.35**		

NET LEVEL OFF WEIGHT – E/O	
PD	**41.10**
FPPM	**2.3.1**

LRC NET LEVEL OFF WEIGHT – E/O	
FPPM	**2.4.13**

CREW OXYGEN REQUIREMENT

PD 41.8, 41.9
FPPM 2.2.15, 2.2.16

RECOMMENDED BRAKE COOLING SCHEDULE

PI 42.10, 42.11
FPPM 1.3.7, 1.3.8